Supplemental Information for the Southern Tessellated Darter Biological Status Review Report

The following pages contain peer reviews received from selected peer reviewers, comments received during the public comment period, and the draft report that was reviewed before the final report was completed

March 31, 2011

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Peer review #1 from Dr. Larry Page

From: Larry Page
To: Imperiled
Subject: Re: Harlequin darter Draft BSR Report
Date: Tuesday, January 25, 2011 11:37:42 AM
Attachments: Crystal darter BSR final draft - L. Page.doc
Harlequin darter BSR final draft - L. Page.doc
Letter re. Crystallaria asprella for FWC.doc
Letter re. Etheostoma histrio for FWC.doc
Letter re. Etheostoma olmstedi for FWC.doc
Readable Version of #2A976E.doc
Southern tessellated darter BSR Final draft - L. Page.doc

Dear Dr. Haubold: I have attached a letter with my brief comments on each of the three species reviews I was asked to read. All seem basically fine to me, except I do not understand what is meant by 'generation time.' On each review I have made the same comment: I don't understand what is meant by 'generation time.' If the species reaches sexual maturity at one year, isn't the generation time one year?

Also, I have made some editorial corrections and suggestions on each of the original files sent to me, and attached those as well.

Thank you for allowing me to review these reports. Please let me know if I can be of more assistance.

Larry

25 January 2011

Elsa M. Haubold, Ph.D.
Section Leader, Species Conservation Planning
Florida Fish and Wildlife Conservation Commission

Dear Dr. Haubold:

The biological status review for the Tessellated Darter prepared by your office appears to be based on complete and accurate information, and I concur with your interpretations and conclusions with one exception. I don't understand your use of the term "generation time." This may be a misunderstanding on my part, but it seems to me that if a species reaches sexual maturity at one year, it has a generation time of one year.

I have made some editorial suggestions on the original file.

Thank you for allowing me to review this report.

Sincerely,

Larry M. Page
Curator of Fishes, Florida Museum of Natural History

Biological Status Review
for the
Southern Tessellated Darter
(*Ethesostoma olmstedi maculaticeps*)

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 September 1, 2010. Public information on the status of the southern tessellated darter was sought from September 17 to November 1, 2010. The members of the biological review group (BRG) met on November 18, 2010. Group members were John R. Knight (FWC lead), William Tate (U. S. Fish and Wildlife Service), and Howard Jelks (U. S. Geological Survey). In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the Lake Eustis Pupfish using criteria included in definitions in 68A-27.001(3) 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://www.myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Southern Tessellated Darter BRG found that the southern tessellated darter, *Etheostoma olmstedi maculaticeps* met at least one of the criteria for listing. Staff recommends listing the southern tessellated darter as a threatened species.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

BIOLOGICAL INFORMATION

Taxonomic Classification- This biological status report is for the southern tessellated darter (*Ethesostoma olmstedi maculaticeps* Cole 1967).

Life History References – Rohde et al. (2009), Marcy et al. (2005), Kuehne and Barbour (1983), Lee and McAllister (1980), Gilbert (1978, 1992), Page (1983), Layzer and Reed (1978), Tsai (1972).

Geographic Range and Distribution - This moderately sized darter occurs in Atlantic slope streams from Ontario, Canada, southward to Florida. The subspecies *E. o. maculaticeps* occurs from the Cape Fear drainage (North Carolina), south to the St. John's River, Florida (Cole 1967, Rohde et al. 2009). In Florida, Gilbert (1978, 1992) reported tesseallated darters from three locations in Marion and Putnam counties. He noted that this fish could be found with regularity only at the Orange Creek site. Four additional individuals were caught at this site during the Rodman Reservoir study in 1993-1994 (http://www.rodmanreservoir.com/Time_Line/studies.htm#vol18, accessed 9 Nov. 2010). Bass et al. (2004) reported tessellated darters were collected from Eaton Creek in 2000, although none

were collected from that location when resampled in 2003. The St. John's population of southern tessellated darter is fragmented from the next closest population to the north (the Atlamaha River, Georgia), being absent from the St. Mary's and Satilla drainages (Gilbert 1992).

Population Status and Trend – Southern tessellated darters inhabit small-to-medium sized streams with sand, mud, silt, or gravel substrates (Gilbert 1978, 1992). Bass et al. (2004) collected the species at only two locations during a statewide monitoring project (Orange Creek and the mainstem Oklawaha River). No population data are available and current population sizes are unknown.

Generation Length- Southern tessellated darters reach sexual maturity at age one, and the maximum age observed is four years (Rohde et al. 2009, Layzer and Reed 1978). Therefore the estimated generation time is 2.5 years. [I don't understand what is meant by 'generation time.' If the species reaches sexual maturity at one year, isn't the generation time one year?]

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 small geographic range and specific habitat occupied by this species in Florida suggests that it may be vulnerable to anthropogenic sources of pollution and habitat alteration. The status of the three known locations for this fish in Florida is unknown. Hybridization could become a threat if other *Etheostoma* species are introduced. Raesly et al. (1990) reported hybrids between *Etheostoma olmstedi* and an introduced species in Pennsylvania. Bass et al. (2004) indicated that the construction of impoundments (such as Rodman Reservoir) destroyed much of the original habitat inhabited by tessellated darters. The Orange Creek watershed appears to be the only location where tessellated darter populations are stable. Efforts are needed to protect this watershed from antropogenic disturbances that could result in possible extirapation of the species from Florida.

Statewide Population Assessment – Findings from the Southern Tessellated Darter BRG are included in the Biological Status Review Information tables.

LISTING RECOMMENDATION

Based on the finding of the sSouthern tessellated darter BRG and in subsequent consultation with other FWC fish experts, staff recommends that the southern tessellated darter, *Etheostoma olmstedi maculaticeps,* be listed as a threatened species because the species meets criteria for listing as described in 68A-27.001(3), F. A. C.

SUMMARY OF THE INDEPENDENT REVIEW – this will be completed after the peer review.

LITERATURE CITED

Bass, G., T. Hoehn, J. Couch and K. McDonald. 2004. Florida Imperiled Fish Species Investigation. Final Report to the U. S. Fish and Wildlife Service. Federal Grant R-3. Florida Fish and Wildlife Conservation Commission, Holt, Florida. 59 pp.

Cole, C.F. 1967. A study of the eastern Johnny darter, *Etheostoma olmstedi* Storer (Teleostei, Percidae). Chesapeake Science 8:28-51.

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Kuehne, R.A. and R.W. Barbour. 1983. The American Darters. University Press of Kentucky, Lexington, KY. 177 pp.

Layzer, J.B. and R.J. Reed. 1978. Food, age and growth of the tessellated darter, *Etheostoma olmstedi*, in Masachusetts. American Midland Naturalist. 100(2): 459-462.

Lee, D.S., and D.E. McAllister. 1980. *Etheostoma olmstedi* tessellated darter. P. 667 in D.S. Lee et al., Atlas of North American Freshwater Fishes. North Carolina State Museum of Natual History. Raleigh.

Marcy Jr, B.C., D.E. Fletcher, F.D. Martin, M.C. Paller, and M.J.M. Reichert. 2005. Fishes of the Middle Savannah River Basin, with Emphasis on the Savannah River Site. University of Georgia Press. Athens Georgia. 462pp.

Page, L.M. 1983. Handbook of Darters. University of Illinois Press, Champaign, IL. 314pp.

Raesly, R.L., J.R. Stauffer, and R.F. Denoncourt. 1990. Hybridization between *Etheostoma zonale* and *Etheostoma olmstedi* (Teleostei: Percidae), following an introduction event. Copeia 1990:584-588.

Rohde, F.C., R.G. Arndt, J.W. Foltz, and J.M. Quatro. 2009. Freshwater Fishes of South Carolina. University of South Carolina Press. Columbia South Carolina. 430pp.

Tsai, C. 1972. Life history of the eastern Johnny darter, *Etheostoma olmstedi* Storer, in cold water and sewage polluted water. Transactions of the Amercian Fisheries Society 1: 80-88.

Peer review #2 from Dr. Steven Herrington

From: Steven J. Herrington
To: Imperiled
Cc: Knight, John; Tate, Bill; Howard Jelks
Subject: Peer reviews of harlequin, crystal, and southern tessellated darters proposed statuses
Date: Thursday, January 27, 2011 3:49:02 PM
Attachments: Southern tessellated darter review_herrington.pdf
Crystal darter review_herrington.pdf
Harlequin darter review_herrington.pdf
Importance: High

To Whom It May Concern,

Attached are my peer reviews of the of the biological status reviews for the harlequin darter (Etheostoma histrio), crystal darter (Crystallaria asprella), and southern tessellated darter (Etheostoma olmstedi maculaticeps) in Florida. I appreciate the opportunity to provide feedback on the proposed conservation status of each species. If you have any questions I can be reached via my contact information below. Thanks…

Steven J. Herrington, Ph.D.
Director of Freshwater Conservation
The Nature Conservancy
Florida Chapter -
Conservation and Science Strategies
10394 NW Longleaf Drive
Bristol, FL 32321

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10394 NW Longleaf Drive
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Nature.org
27 January 2011

Florida Fish and Wildlife Conservation Commission
Biological Status Review
imperiled@myfwc.com

Re: Biological status review for the southern tessellated dater (*Etheostoma olmstedi maculaticeps*) in Florida

To Whom It May Concern,

The Nature Conservancy appreciates the opportunity to provide a peer review of the biological status review of the southern tessellated darter (*Etheostoma olmstedi maculaticeps*) in Florida. The Conservancy is a leader in freshwater conservation throughout the world, including strategies to protect, restore, and conserve freshwater habitat and biota in Florida and the southeastern U.S. Specifically, we have actively worked with local, state, and federal partners to complete actions such as on-the-ground stream restoration, modification of water facility operations to promote migratory fish passage, and state- and basin-wide policy advocation to protect water quality and quantity in this state and region. Among our focal areas for freshwater conservation is the St. Johns River, identified by the Biological Review Group (BRG) as the only known drainage containing southern tessellated darters in Florida. Like many diminutive, non-game fishes, little is known of the population status and viability of this species in Florida or in most other parts of its range. Although it can be locally abundant in other areas of its range, its limited collection records from only three streams in Florida, in combination with large-scale habitat loss and lack of connectivity due to impoundment in the drainage, suggest that the southern tessellated darter is vulnerable to extirpation from Florida waters.

The Conservancy believes that the methods, data, analysis, and interpretation for assessing the conservation status of the southern tessellated darter in Florida were appropriately employed by the BRG. We also believe that the BRG used the best information available to provide a reasonable and justifiable interpretation of the data and proposed conservation status. We agree with the BRG with its conclusions on the known range of this species, population trend assessment, and threats which potential imperil its populations in Florida. We believe it is reasonable to conclude that it is likely stable in the Orange Creek watershed and that it's limited range within Florida, in combination with population fragmentation, habitat degradation and loss due directly and indirectly to the Rodman Reservoir, increases its vulnerability to extirpation from Florida waters. Although hybridization could negatively affect the remaining population(s) of the southern tessellated darter, we believe it is unlikely given the nearby fish fauna, likely vectors of introduction, and life history of this species (though we support its documentation in the review).

As such, we agree with the BRG's conclusion that its rarity in Florida, vulnerability to extirpation, and dearth of information on its population status and comparative trends warrant designation as a state threatened species. We recommend that the BRG expeditiously revisit the conservation status of the southern tessellated darter should additional information on the population status, reproductive ecology, and/or threats potentially imperiling the southern tessellated darter in Florida become available.

Sincerely,

Steven J. Herrington, Ph.D.
Director of Freshwater Conservation

Peer review #3 from Dr. Brett Albanese

Please accept this email as my official review of BSR reports for crystal and southern tessellated darters.

Southern Tessellated Darter

I concur with the decision to list the southern tessellated darter as a threatened species in Florida. This species has a very small geographic range within Florida and is isolated from other populations by hundreds of miles. It has only been documented from one site within the last decade. Furthermore, its historic habitat has been altered by construction of Rodman Reservoir. Based upon the evidence provided, the species is at high risk of extirpation from the state of Florida and watershed-level protection efforts are needed to increase its chances for survival. Thanks for the opportunity to review,

Brett Albanese, Ph.D.
Georgia Department of Natural Resources
Nongame Conservation Section
Wildlife Resources Conservation Center
2065 U.S. Highway 278 SE
Social Circle, GA 30025-4743

Peer review #4 from Dr. Catherine Phillips

From: Catherine_Phillips@fws.gov
To: Imperiled
Subject: review of BSR
Date: Thursday, January 27, 2011 10:55:59 AM
Attachments: CT Phillips Review of BSR Florida.docx

Attached is my review of the BSR for the Southern tesselated darter, the Harlequin darter, and the Crystal darter.

Please contact me if you have any questions.

Catherine T. Phillips, PhD
Deputy Project Leader - FWCO
Panama City Field Office
U.S. Fish and Wildlife Service
1601 Balboa Ave
Panama City, Florida 32405

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Panama City Field Office
1601 Balboa Avenue
Panama City, Florida 32405
850-769-0552 ext.242
Catherine_Phillips@fws.gov

27 January 2011

Mr. John Knight,

Attached is my review of the Biological Status Review of the crystal darter, the harlequin darter, and the Southern tessellated darter. Please contact me if you have any questions or need any clarification regarding my review.

Sincerely,

Catherine T. Phillips, PhD
Deputy Project Leader – Fish and Wildlife Conservation Office

Review of Biological Status Review for *Crystallaria asprella*, *Etheostoma olmstedi maculaticeps*, and *Etheostoma histrio*

Southern Tesselated darter - *Ethsostoma olmstedi maculaticeps*

Ethsostoma olmstedi maculaticeps in Florida represents a disjunct population from a more widely distributed range. The information provided in the Biological Status Review for *E. olmstedi maculaticeps* should include some more information about reproductive ecology and threats specific to this type of reproductive ecology. Often this is overlooked in species conservation, but can be critical in understanding threats and restoring current populations. For example, *E. olmstedi maculaticeps* is a cavity spawner that clusters eggs. Males also provide parental care. Knowing this is important because lack of suitable slabs of rock the proper size to be used as cavities may be a limiting factor in the available habitat. Habitat structure supplementation has worked in increasing population numbers in other cavity nesters. Habitat destruction through siltation and damming will greatly decrease heterogeneity of structure in a river and may cover spawning habitat.

Given the information in the literature and the BSR, I do not believe that *E. olmstedi maculaticeps* warrants higher state listing than species of concern at this time.

Copy of the Southern tessellated darter BSR draft report that was sent out for peer review

Biological Status Review for the Southern Tessellated Darter (*Ethsostoma olmstedi maculaticeps*)

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only at the Orange Creek site. Four additional individuals were caught at this site during the Rodman Reservoir study in 1993-1994 (http://www.rodmanreservoir.com/Time_Line/studies.htm#vol18, accessed 9 Nov. 2010). Bass et al. (2004) reported tessellated darters were collected from Eaton Creek in 2000, although none were collected from that location when resampled in 2003. The St. John's population of southern tessellated darter is fragmented from the next closest population to the north (the Atlamaha River, Georgia), being absent from the St. Mary's and Satilla drainages (Gilbert 1992).

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Statewide Population Assessment – Findings from the Southern Tessellated Darter BRG are included in the Biological Status Review Information tables.

LISTING RECOMMENDATION

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SUMMARY OF THE INDEPENDENT REVIEW – this will be completed after the peer review.

LITERATURE CITED

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Tsai, C. 1972. Life history of the eastern Johnny darter, *Etheostoma olmstedi* Storer, in cold water and sewage polluted water. Transactions of the Amercian Fisheries Society 1: 80-88.

Biological Status Review Information
Findings

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

Generation length: 10 years

Criterion/Listing Measure	Data/Information	Data Type*	Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). 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]	Data not available		No	
(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]	Data not available		No	
(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]	Data not available		No	
(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]	Data not available		No	
[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	Based on 2.59 sq km grid and known recent locations (32 grids). EOO was calculated as 95.6 sq km	E	Y	Bass et al. 2004, FWC GIS data
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Based on 2.59 sq km grid and known recent locations (32 grids). AOO was calculated as 95.6 sq km	E	Y	Bass et al. 2004, FWC GIS data
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	1 location record in past 10 years, 6 historical locations	O	Y	Bass et al. (2004), 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	historic range decline (from 6 to 1 location), loss of quality habitat (e.g., Rodman Reservoir). Reservoir construction completed in 1968. Collections of *E. olmstedi* pre-date impoundment	I	Y (iii, iv)	Bass et al. (2004)
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	no available data		No	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	16 specimens collected in past 10 years	S	Y	Bass et al. (2004), FWC GIS data
(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	no available data		No	
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	no available data		No	
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 available data		No	
(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	1 location record in past 10 years, 6 historical locations	O	Y	Bass et al. (2004), FWC GIS data
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	No available data		No	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
Y	B1+2ab(iii,iv); D2

Is species/taxon endemic to Florida? (Y/N)	Yes, next closest drainage is Altamaha (functionally endemic), no probability of exchange
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 are met)
Y	B1+2ab(iii,iv); D2

1	Biological Status Review Information Regional Assessment Species/taxon:	*Etheostoma olmstedi maculaticeps*
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: Biological Review Group Members' Biographies

Bill Tate (U.S. Fish and Wildlife Service)
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 (U.S. Geological Survey)
Howard 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 (FFWCC/FWRI)
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 FWCC'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.

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

APPENDIX 3. **Information and comments received from independent reviewers.**

To be added later.