Supplemental Information for the Saltmarsh Topminnow

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. Gray Bass

From: Gray Bass [mailto:graybass43@live.com]
Sent: Monday, January 31, 2011 11:27 AM
To: Hoehn, Ted
Subject: Bluenose, Saltmarsh and Blackmouth reviews

Well, Ted, I ought'a be whipped with a three-day-old-dead eel. But, here, belatedly, are the reiviews for the Bluenose shiner, Saltmarsh topminnow, and Blackmouth shiner. (The Lake Eustis pupfish review has been sent to both Bill Johnson and yourself.)

Actually, the review documents were attached to the original e-mails. However, the documents themselves were off-screen on my computer. The bureaucratic stuff took up all the normal attachment space. After you mentioned they were there, I found I could get to them by "scrolling right". At any rate, I used the versions you sent recently, except for the L. E. pupfish file.

Be good,

Gray

January 2010
Saltmarsh topminnow review (by Gray Bass)
To: Ted Hoehn (FWC)

Ted:

(1) Your conclusions and recommendations for the Saltmarsh topminnow are correct. It should be listed as a Threatened species.

(2) However, future investigations may show it to be much more abundant than we now believe. I suspect we have sampled marginal populations and missed the basic microhabitats , possibly because of the difficulty of access to the interior of salt marshes.

(3) In the "back of my mind" I do recall a record for Choctawhatchee Bay. During the *Imperiled Species* project, I tried to relocate this reference (if it ever existed) unsuccessfully.

Sincerely,

Gray

Peer review #2 from Dr. Bernard Kuhadja

From: Bernard Kuhajda
To: Imperiled
Subject: Review of Biological Staus Reviews for FWC
Date: Wednesday, February 02, 2011 3:49:17 PM
Attachments: Review of BSR Saltmarsh Topminnow F. jenkinsi.doc
Review of BSR Blackmouth Shiner N. melanostomus.doc
Review of BSR Bluenose Shiner P. welaka.doc

Attached please find reviews of Biological Staus Reviews for FWC for three species, Fundulus jenkinsi, Notroois melanostomus, and Pteronotropis welaka. Let me know if you have any questions.
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Bernard Kuhajda
Collections Manager
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Box 870345
University of Alabama
Tuscaloosa, AL 35487-0345

This is an independent review by Bernard Kuhajda of the draft Biological Status Review for the Saltmarsh Topminnow (*Fundulus jenkinsi*) by Mark Peterson Frank Nordlie, and Theodore Hoehn. This review is at the request of the Florida Fish and Wildlife Conservation Commission.

The biological review group (BRG) for the Saltmarsh Topminnow concluded the species met criteria B2ab and D2 and Florida Fish and Wildlife Conservation Commission staff recommended that the species be listed as a state-designated Threatened species.

These criteria were met based on the species being limited to 5 locations (B2a and D2) (needs to be mentioned in Geographic Range and Distribution section), habitat likely in decline and subject to future deterioration (B2b), and area of occupancy close to the 8 miles^2 as a second option to meet the criteria for D2.

The appropriate literature has been cited and the threats to the species have been addressed. From the data presented it is not clear whether this species meet the criteria B2ab and D2, but it may still warrant listing as a state-designated Threatened species.

There are several issues that need to be addressed in this draft document including the number of localities, area of occupancy, and the Florida distribution map for the Saltmarsh Topminnow. The BRG "generally felt" that there were 5 locations for this species based on the map generated from the FWC database, but the map did not contain localities from recent collections made by Dr. Peterson, even though he is a member of the BRG. This is very odd and leaves one not knowing if there are only 5 Florida localities or if there are more for this species. If there are more localities, then the Saltmarsh Topminnow does not meet the meet one of the criteria for D2 (5 or fewer locations) but may still meet one of the criterion for B2a ($\leq$ 10 locations). These data may also affect the area of occupancy. Even with the current data, the BRG appears to be compressing the area of occupancy beyond reasonable limits, trying to meet the other criterion for D2. The BRG at first estimates the area of occupancy at 11.57 miles^2, then revises the estimate to 10.54 miles^2, and then again states that this revised estimate is an over-estimate and is actually "close to 8 miles^2 required by the criterion [for D2]. . ." From this draft document it is not clear that the Saltmarsh Topminnow meets either criterion for D2. Another issue with the map is that over half of the plotted localities are not in areas shaded in green as potential habitat for this species. Does this mean these records are waifs or that these are historic records and the species is now absent from these areas? This needs to be addressed and made clear. The final map should also show both all collection sites and also indicate areas that are considered a "single" location to be used in listing criteria.

Even though the Saltmarsh Topminnow does not meet the requirements for D2 it still meets the criteria for B2b and potentially B2a (if there are $\leq$ 10 locations after addition of recent locality data) and may still warrant listing as a state-designated Threatened species.

Peer review #3 from Calusa Horn

From: calusa horn
To: Imperiled
Subject: Re: Deadline reminder for peer reviews of BSR reports
Date: Friday, January 28, 2011 2:40:59 PM
Attachments: calusa_horn.vcf

Comments of the Biological Status Review on Florida's Population of the Saltmarsh topminnow (*Fundulus jenkinsi*):

The best available scientific information on Florida's population of *Fundulus jenkinsi* was reviewed an accurately interpreted by the BSR. The BSRs conclusion and interpretation of best available scientific information, as well as, the application of that information using the IUCN Red List criteria appears to be accurate.

It would be beneficial to note that BSR evaluated only Florida's population of *Fundulus jenkinsi* against the IUCN criteria and did not consider information on existing populations and habitat occurring outside Florida.

Thank you for the opportunity to review and provide comments.

Copy of the Saltmarsh topminnow BSR draft report that was sent out for peer review

Biological Status Review for the Saltmarsh Topminnow *(Fundulus jenkinsi)*

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 saltmarsh topminnow (*Fundulus jenkinsi*) was sought from September 17 to November 1, 2010. The members of the biological review group (BRG) met on December 6, 2010. Group members were Dr. Mark Peterson (USM), Dr. Frank Nordlie (UF), and Theodore Hoehn (FWC). In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the saltmarsh topminnow 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 BSG concluded from the biological assessment that the saltmarsh topminow met criteria B2ab and D2. FWC staff recommends that the saltmarsh topminow be listed as a state-designated 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 saltmarsh topminnow *Fundulus jenkinsi*, in Florida. Evermann (1892).

Life History References – Bass et al., (2004); Gilbert and Relyea (1992); Lang (2010); Lopez et al., (2010); Lopez et al., (2010b); NOAA/NMFS (2009); Peterson et al., (2003); Thompson (1999).

Geographic Range and Distribution – The saltmarsh topminnow (*Fundulus jenkinsi*) ranges from Galveston Bay, Texas to Pensacola/Escambia Bay, Florida. In Florida the range is limited to Perdido Bay and Pensacola/Escambia Bay estuaries (Gilbert and Relyea, 1992; Lopez et al., 2010b; NOAA/NMFS, 2009; Peterson et al., 2003; Thompson, 1999).

Population Status and Trend – The population of saltmarsh topminnows appear to be declining with loss of habitat (NOAA, 2009). Patchy populations within the Pensacola Bay system indicate that the species is more prevalent than first believed (Bass et al., 2004).

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

BIOLOGICAL STATUS ASSESSMENT

Threats – The loss of small, interconnected dendritic intertidal creeks linking the mid and high salt marshes are key components to the survival of the species (Lopez et al., 2010; Lopez et al., 2010b; Thompson, 1999). Marsh erosion, low stem density, conversion of marsh to deeper open areas, dredging, hard shoreline structures, and sea level rise are also major factors contributing to the habitat decline in areas used by the saltmarsh topminnow (NOAA, 2009; Lopez et al., 2010b; Peterson et al., 2003; Thompson, 1999). Alternation of normal changes in water temperature, salinity, and turbidity may possibly alter season cues that influence reproduction and spawning (Lopez et al., 2010b). The "Florida 2060" research project prepared for 1000 Friends of Florida indicates that the areas around Pensacola, Milton, and Santa Rosa Sound will see substantial increases in growth (Zwick and Carr, 2006). These projected changes are in the areas of potential habitat for the saltmarsh topminnow.

Statewide Population Assessment - Findings from the BRG are included in Biological Status Review Information tables.

LISTING RECOMMENDATION – Staff recommends that the saltmarsh topminnow 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*

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LITERATURE CITED

Bass, D.G., T. Hoehn, J. Couch, K. Mcdonald. 2004. Florida Imperiled Fish Species Investigations. Florida Fish and Wildlife Conservation Commission, Tallahassee. 59p.

Evermann, B.W. 1892. A report upon investigations made in Texas in 1891. Bulletin of the U.S. Fisheries Commission (1891) 11:61-90.

Gilbert, C.R. and K. Relyea. 1992. Saltmarsh Topminnow, *Fundulus jenkinsi*. Pages 68-72 in, Gilbert, C. R. (ed.). Rare and endangered biota of Florida. Volume II. Fishes. University Press of Florida, Gainesville, Florida.

Lang, E. 2010. Reproductive life history of *Fundulus jenkinsi* and comparative development of five sympatric Fundulid species. Master of Science Thesis, The University of Southern Mississippi. 70 p.

Lopez, J.D., M. S. Peterson, E. T. Lang, and A. M. Charbonnet. 2010. Linking habitat and life history for conservation of the rare saltmarsh topminnow *Fundulus jenkinsi*: morphometrics, reproduction, and trophic ecology. Endangered Species Research V12:141-155.

Lopez, J.D., M. S. Peterson, J. Walker, G. Grammer, and M. S. Woodrey. 2010b (in Press). Distribution, Abundance, and Habitat Characterization of the Saltmarsh Topminnow, *Fundulus jenkinsi* (Evermann 1892). Estuaries and Coasts http://DX. DOI.org/10.1007/s12237-010-9266-5.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2009. Saltmarsh topminnow *Fundulus jenkinsi*, Species of Concern factsheet. National Marine Fisheries Service, Office of Protected Species. Silver Spring, Maryland. 3p.

Peterson, M.S., G.L. Fulling, and C.M. Woodley. 2003. Status and habitat characteristics of the saltmarsh topminnow, *Fundulus jenkinsi* (Evermann), in eastern Mississippi and western Alabama coastal bayous. Gulf and Caribbean Research 15: 51–59.

Thompson, B.A. 1999. An evaluation of the saltmarsh topminnow *Fundulus jenkinsi*: Final Report, 20 August 1999 revision. National Oceanic and Atmospheric Administration, National Marine Fisheries Service. St. Petersburg, Florida. 18p.

Zwick, P.D. and M.H. Carr. 2006. Florida 2060, a population distribution scenario for the State of Florida. Prepared for the 1000 Friends of Florida by the Geoplan Center, University of Florida, Gainesville, Florida. 29 p.

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Biological Status Review Information
Findings

Species/taxon: Saltmarsh Topminnow
Date: 12/06/10
Assessors: Hoehn, Nordlie, Peterson

Generation length: 10 years (1-3 years life expectancy)

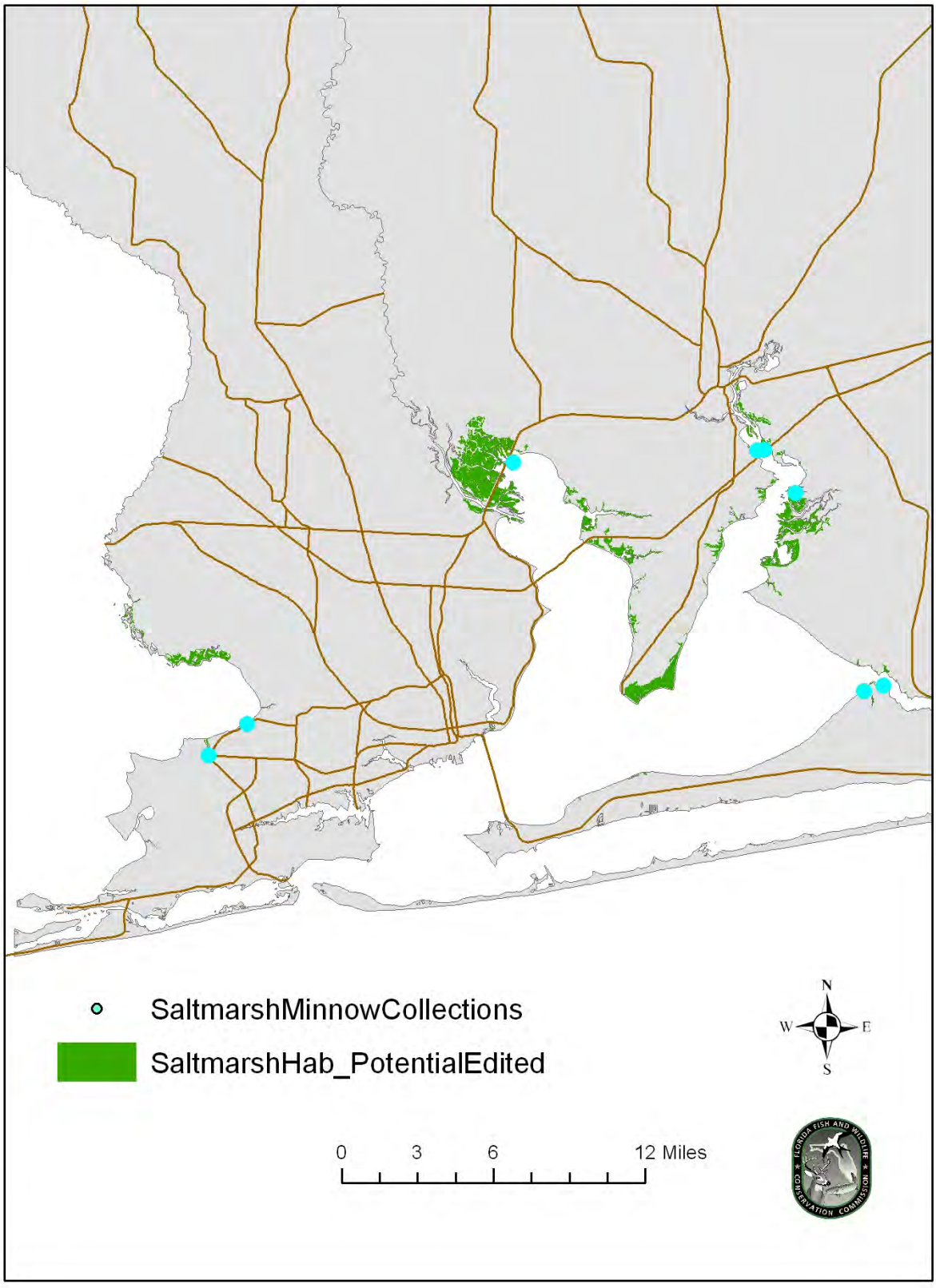
Criterion/Listing Measure	Data/Information	Data Type*	Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected 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]	We do not know or have population size information - no data available		N	
(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]	We do not know or have population size information - no data available		N	
(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]	We do not know or have population size information - no data available		N	
(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]	We do not know or have population size information - no data available		N	
[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)	Estimated based upon GIS saltmarsh habitat (over estimate of 11.57 miles²; likely 10.54 miles²)	E	Y	FWC GIS data- Cooperative Land Cover Map 2010; Bass et al., 2004; FWC collections
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Estimated based upon GIS saltmarsh habitat and collection information. Number of locations is 5.	E	Y	FWC GIS data- Cooperative Land Cover Map 2010; Bass et al., 2004; Lopez et al., 2010b; FWC collections

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	decline and loss of saltmarsh habitat, conversion of wetlands and increased development in area	I	Y	Lopez et al., 2010; Lopez et al., 2010b; NOAA, 2009; Zwick and Carr, 2006
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	not enough data to make an estimate on this- no data to support		N	
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	not enough data to make an estimate on this- no data to support		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	not enough data to make an estimate on this- no data to support		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	estimate of saltmarsh is ~10.54 miles² (this may be an over-estimate); estimate 5 locations which leaves out the higher salinity areas of the Perdido and Pensacola Bay System	E/I	Y	FWC GIS data- Cooperative Land Cover Map, 2010; FWC fisheries data; Lopez et al., 2010b
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years			N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
Does meet the criteria	B2ab; D2
Is species/taxon endemic to Florida? (Y/N)	N
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)
Meets the Criteria	B2ab; D2

1	Species/taxon:	Saltmarsh Topminnow
2	Biological Status Review Information Regional Assessment	Date: 12/6/10
3		Assessors: Hoehn, Nordlie, Peterson
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

Saltmarsh Topminnow



Additional notes – The BRG discussed the listing criteria and determined that there was insufficient information to determine exact population size reduction (Criterion A), population size and trends (Criterion C), and there had been no specific population viability analysis developed (Criterion E). The group discussed the geographic range (Criterion B) and its sub-criteria under this category. The BRG agreed that the location information met Criterion B2 based upon known collection locations and a GIS estimate of potential saltmarsh habitat of ~10.54 miles² (6,748 acres). The BRG found that Criterion B2a was met due to the limited extent of collections and five locations. Criterion B2b was found to have been met since saltmarsh habitat is likely in decline and subject to degradation over the next 20 years. The BRG discussed Criterion D and felt that it was met due to the five locations and was close to meeting the 8 miles² criterion since the estimated saltmarsh habitat would not likely be fully occupied. The BRG concluded from the biological assessment that the saltmarsh topminnow met the criterion D for listing.

The BRG discussed that the species is limited to Spartina marshes as documented in many of the publications. They are associated with the Spartina due to a similar salinity tolerance. The adults tend to spawn during the highest tides in the upper marshes where there is both cover and lower salinity. The typical lifespan is one to two-years with very old individuals being 3 years. The BRG discussed location information to help identify the number of locations that the area of occupancy covers. They discussed the draft map that contained the known sample locations (minus those collected by Dr. Peterson in the past few years which were not in the FWC database) and the aerial extent of seagrass habitat, as identified by the FWC Cooperative Land Cover Map 2010. It was felt that the estimate of 11.57 miles² was an overestimate since the species would likely not be present in the higher salinity environments like Santa Rosa Sound. A revised estimate was made, after the meeting based upon the BRG's recommendations, which indicated 10.54 miles² of saltmarsh habitat in the Perdido and Pensacola Bay System (Criterion B2). The BRG in reviewing the map generally felt that there were 5 locations- Perdido Bay, Escambia River delta/Bay, Garcon Point, Blackwater Bay and East Bay (Criterion B2a). It was also discussed that the species tended to stay in a general area, but might have some redistribution during a significant storm or flooding events. But otherwise, it was unlikely that there would be much movement. It was felt that based upon the available habitat, loss of dendritic saltmarsh habitat, increased development pressure in the area, and degradation of WQ in some of the saltmarsh habitats near development, that Criterion B2b was met. At present, there is not enough sample information to make a population trends estimate or an estimate of number of mature individuals (Criterion A, C, and D1). The BRG discussed that this is due to the difficulty in sampling. Dr. Peterson indicated that the species had a very patchy distribution, but where they were found, they were abundant. The BRG also discussed that Florida is the easternmost portion of their range. Finally the BRG discussed that because the locations were estimated to be 5 and there were an over-estimate of 10.54 miles² of saltmarsh habitat in the Perdido and Pensacola Bay System, that Criterion D2 was met. The estimate of 10.54 miles² of saltmarsh habitat was close to the 8 miles² required by the criterion since not all of the habitat would likely not be suitable.

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Appendix 1. Biological review group members' biographies

Dr. Frank Nordlie (University of Florida, Professor Emeritus)

Dr. Frank G. Nordlie received his Ph.D. from the University of Minnesota in 1961. He served as professor, and ultimately department chair, of Zoology at the University of Florida; and now has earned Professor Emeritus status. He has conducted numerous osmo-regulation studies on subspecies of the sheepshead minnow (*C. variegatus*) including Lake Eustis pupfish, and has publications referent to these fishes ranging over three decades.

Dr. Mark Peterson (USM, Gulf Coast Research Laboratory)

Dr. Mark Peterson received his Ph.D. from the University of Southern Mississippi in 1987. He has a broad interest in how fishes and other nekton (crabs, shrimp, etc.) interact with their habitat and the other organisms (plants, invertebrates, etc.) that live there in a quantitative manner and use various statistics to support these relationships. In that vein, he is interested in how altered coastal habitat functions compared to more pristine habitat in terms of survival, growth, reproduction and habitat use patterns of fishes and other nekton in a comparative manner. His program at the University of Southern Mississippi Gulf Coast Research Laboratory is the primary source of research on the saltmarsh topminnow (*Fundulus jenkinsi*), across its range in the northern Gulf of Mexico.

Ted Hoehn (FWC/HCSS, Lead-shiners, saltmarsh topminnow),

Ted Hoehn, is a current employee of the Fish and Wildlife Conservation Commission with long experience in mapping the distribution of Florida fishes. He initiated the Florida's Aquatic Species and Habitat Conservation Planning (Aquatic GAP) Project. His distribution maps were derived from collections by the Commission, other agencies, and academic institutions throughout the country. His freshwater fish distribution data are the most comprehensive in the state. He has also long been involved with ecological and environmental issues, especially those related to the state's major river, the Apalachicola. Ted received his Masters in Biology (Marine emphasis) from Florida State University in 1983.

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

No additional public information was received during the public solicitation period.

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APPENDIX 3. Information and comments received from independent reviewers.

To be added after the peer review.

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