Saltmarsh Topminnow Biological Status Review Report

March 31, 2011

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

Biological Status Review
for the
Saltmarsh Topminnow
(*Fundulus jenkinsi*)
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 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 (University of Southern Mississippi), Dr. Frank Nordlie (University of Florida), and Theodore Hoehn (FWC) (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 saltmarsh topminnow 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 BRG concluded from the biological assessment that the saltmarsh topminnow met listing criteria. FWC staff recommends that the saltmarsh topminnow be listed as a Threatened species.

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.

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., (2010a); 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/NMFS, 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/NMFS, 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.

Population Assessment - Findings from the BRG are included in the Biological Status Review Information findings tables. The BRG reviewed the saltmarsh topminnow as it occurs in Florida only. Through the regional assessment, the BRG then looked at whether contributions from outside of Florida would make a difference in the status of the population in Florida (Regional Assessment table). The BRG concluded that Florida does not receive immigration of mature individuals and therefore populations outside of Florida would not lead to a change in the findings of the group.

LISTING RECOMMENDATION

Staff recommends that the saltmarsh topminnow be listed as a Threatened species in Florida because the species meets listing criteria as described in 68A-27.001, F.A.C., and in the following BRG findings table.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 3 reviewers, Ms. Calusa Horn (NOAA/NMFS), Dr. Bernard Kuhadja (University of Alabama), and Mr. Gray Bass (FWC-retired). Appropriate editorial changes recommended by the reviewers were made to the report.

One reviewer questioned if the species met the requirements for Criteria B2ab and D2, based upon documentation in the BSR. He asked why the recent Peterson collection information wasn't used to add more "locations" which would have meant the species did not meet listing criterion D2.

FWC response: Dr. Peterson's collection site information fell within the boundaries of potential habitat that had been mapped. The BRG reviewed where collections had been reported historically; in addition to recent collections by Dr. Peterson's group. To determine "locations" as defined for the listing process, the BRG reviewed the potential saltmarsh habitat and identified approximate areas of dispersal, based upon site collections. These dispersal areas were then considered as "locations." These locations were Perdido Bay, Escambia River delta/Bay, Garcon Point, Blackwater Bay and East Bay (as noted in the BRG findings and on the revised map). Because they were within the dispersal areas from which collections had already been made, the number of locations did not increase in spite of Dr. Peterson's adding collection sites.

One reviewer indicated that there the FWC sampling effort missed some of the habitats due to difficulty in sampling the saltmarshes.

FWC response: Dr. Peterson's group used different sampling gear that allowed them to collect in habitats that previous FWC efforts could not. Staff believes that Dr. Peterson's methods have allowed all potential habitat to be sampled.

One reviewer was concerned about the estimates of area of occupancy as the BRG decided during their discussions that it was likely smaller than the initial estimate they reviewed. He also questioned whether Criterion D2 (restricted area of occupancy) had been met.

FWC response: After discussing the mapping information provided by FWC staff for the review, the BRG removed habitat that was in higher salinity areas unlikely to contain saltmarsh topminnows. The potential saltmarsh habitat in these locations was then calculated with the acknowledgement that it overestimated potential habitat due to salinity requirements of the saltmarsh topminnow and the salinity regime within the habitat. While this estimate of 10.54 mi^2 was greater than the "typically less than 8 mi^2" for meeting criterion D2, the BRG felt that the amount of "suitable" habitat was within error of the overestimation of potential habitat to consider this species as meeting the restricted area of occupancy criterion. Staff believes the findings of the BRG are valid.

One reviewer was concerned that the sampling locations did not appear to be in the identified habitat in the map included in the report.

FWC response: Some of the potential habitat (depicted in green) is very small and becomes obscured when the collection sites (blue dots) are laid over it, giving the appearance of lack of saltmarsh habitat because it is hidden by the circle indicating the sampling location. All saltmarsh topminnow collection sites are within potential saltmarsh habitat.

All reviewers concurred with the staff recommendation that the saltmarsh topminnow be listed as a Threatened species. Peer reviews are available at MyFWC.com.

LITERATURE CITED

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

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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.

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)

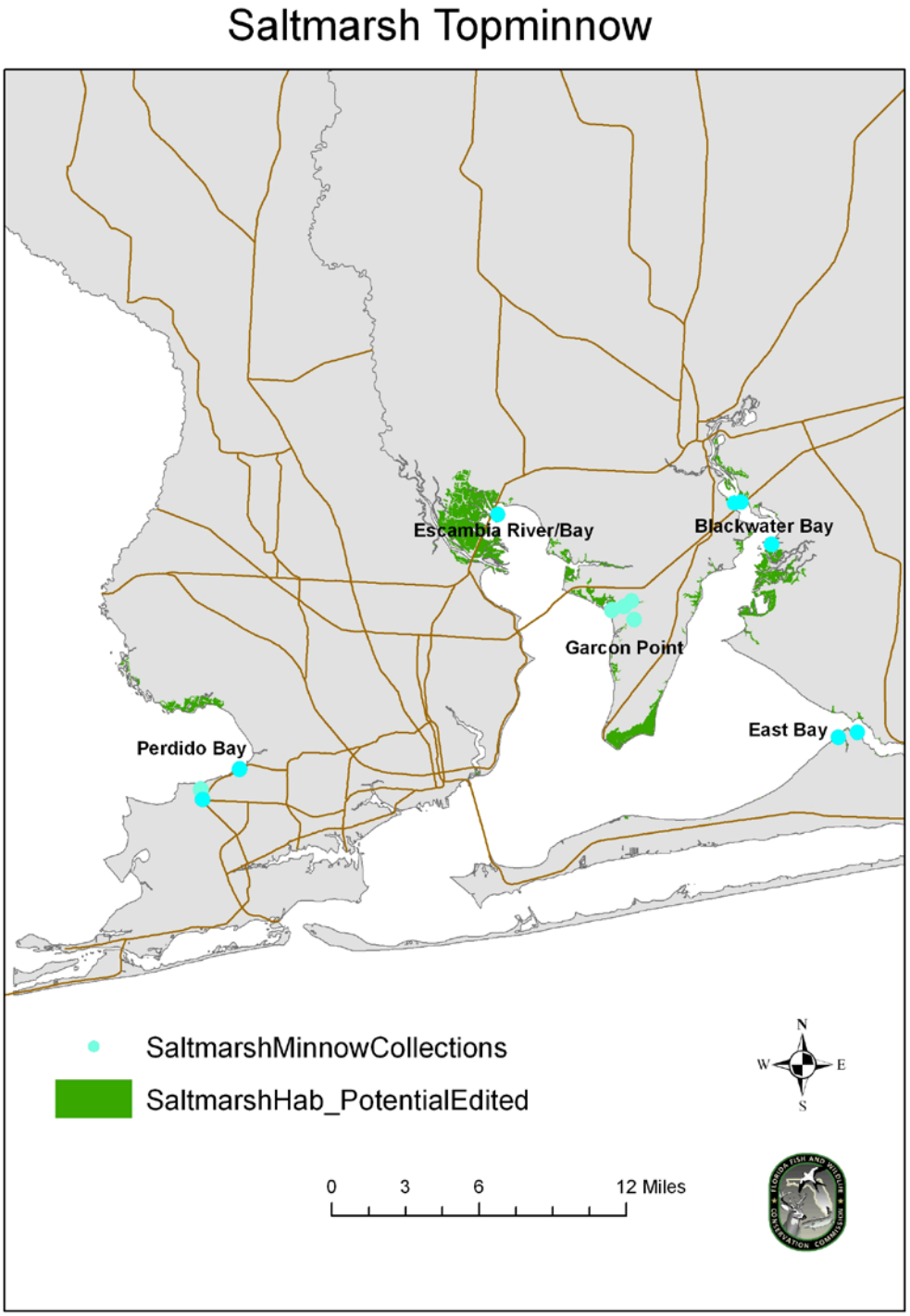
Criterion/Listing Measure	Data/Information	Data Type*	Sub-Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Sub-Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or 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]	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 $miles^2$ (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/sub-criteria OR Does not meet any of the criteria/sub-criteria)	Reason (which criteria/sub-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
Escambia River/Bay
Blackwater Bay
Garcon Point
East Bay
Perdido Bay
SaltmarshMinnowCollections
SaltmarshHab_PotentialEdited
N
W
E
S
0
3
6
12 Miles

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. Dr. Peterson indicated that his collections were in the areas already identified as potential habitat. 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.

APPENDIX 1. Brief biographies of the Saltmarsh topminnow Biological Review Group members.

Dr. Frank 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 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.

Theodore 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.

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.