# Key Silverside 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 Key Silverside (*Menidia conchorum*) 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 Key silverside, *Menidia conchorum*, was sought from September 17 to November 1, 2010. The members of a Biological Review Group (BRG) met on November 18-19. Group members were Martha Bademan (FWC lead), George Burgess (Florida Museum of Natural History), and Grant Gilmore (Estuarine, Coastal, and Ocean Science, Inc.) (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 Key silverside 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 Key silverside met listing criteria. Based on the literature review, information received from the public, and the BRG findings, staff recommends listing the Key silverside 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. Staff would also like to thank Dr. Joseph Mitchell who served as a data compiler on the species report.

## BIOLOGICAL INFORMATION

**Life History References –** Bloom et al. 2009, Conover et al. 2000, Duggins et al. 1986, Getter 1981, Gilbert 1978.

**Taxonomic Classification –** The taxonomic status of the Key silverside (*Menidia conchorum*) is unclear. The Key silverside may be distinguished from other *Menidia* silversides by morphometric characteristics; however, these measures are not always reliable because of intra- and inter-specific morphological variations (Duggins et al. 1986, Conover et al. 2000).

Allozyme and mitochondrial DNA analyses suggest that the Key silverside is not a distinct species, but an ecotype or subspecies of *M. peninsulae*, the tidewater silverside (Duggins et al. 1986, Bloom et al. 2009). For the purposes of this biological status review, Key silverside is considered a distinct taxonomic unit.

**Population Status and Trend –** The total number of Key silversides in Florida is unknown. Conover et al. (2000) found little evidence of a Key silverside population decline during a 1999 survey in which 2,680 specimens were collected. The Key silverside seems to be abundant in the limited area where it occurs; however, local population numbers fluctuate (Gilbert 1978, Getter 1981, Conover et al. 2000). Key silversides are believed to live up to one year (Getter 1981).

**Geographic Range and Distribution –** The Key silverside is endemic to the lower and middle Florida Keys. Key silversides have been documented in lagoons on Long Key, Grassy Key, Big Pine Key, No Name Key, Little Torch Key, Cudjoe Key, Sugarloaf Key, Saddle Bunch Key, Rockland Key, Boca Chica, and Key West. However, the presence of Key silverside in available habitats is sporadic and ephemeral (Getter 1981, Conover et al. 2000). Conover et al. (2000) collected silversides on Key Largo and mainland Florida north of Key Largo that were identified as either Key silverside or tidewater silverside. Duggins et al. (1986) and Conover et al. (2000) hypothesized that the Key silverside also occurs at other sites in the Keys that are not accessible by road or easily sampled.

The Key silverside is generally found in protected, saline lagoons and ponds with restricted tidal exchange (Getter 1981, Conover et al. 2000). However, the Key silverside is known to be tolerant of a wide range of salinities (Getter 1981).

**Quantitative Analyses –** We are not aware of a population viability analysis for the Key silverside.

## BIOLOGICAL STATUS ASSESSMENT

**Threats –** Habitat loss and alteration is a major threat to the Key silverside. Several documented Key silverside habitat sites have been filled, destroyed, or altered by development (Gilbert 1978, Getter 1981, Duggins et al. 1986, Conover et al. 2000). Since Conover et al.'s (2000) survey of Key silverside habitats, habitat sites have been destroyed, reduced, or altered by development, hurricanes, and flooding (Getter, personal communication 2/3/11). Because the lagoons and ponds occupied by Key silversides are limited, development or alteration of remaining habitat could be detrimental to Key silverside subpopulations. Conover et al. (2000) predicted that as the protected lagoons inhabited by Key silversides are inundated and joined to open water, the Key silverside would be replaced by the hardhead silverside, *Atherinomorus stipes*. Getter noted that piscivorous fish such as snapper and grouper were more abundant at some Key silverside sites in 2010 than during surveys taken in the 1970s (personal communication 2/3/11). Getter (1981) also noted that a population of Key silversides disappeared from a pond on Big Pine Key following introduction of the blue gill, *Lepomis macrochirus*, and the appearance of external trematode parasites on the Key silversides.

**Population Assessment** – Findings from the BRG are included in the Biological Status Review Information Findings table, below.

## LISTING RECOMMENDATION

Based on the finding of the Key silverside BRG and subsequent consultation with other FWC fish experts, staff recommends that the Key silverside (*Menidia conchorum*) be listed as a Threatened species because it met criteria for listing in accordance with rule 68A-27.0012, F.A.C.

## SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from three reviewers, Dr. Charles D. Getter, Dr. William F. Loftus (Aquatic Research & Communication, LLC), and Ms. Calusa Horn (NOAA Fisheries Service). Appropriate editorial changes recommended by the reviewers were made to the report. While all reviewers agreed with the staff recommendation, one reviewer suggested that information regarding the threat of sea level rise on Key silverside should be factored into the biological status review. According to IUCN guidance documents, projected population decline (criterion A3) should be estimated over the the next ten years or three generations, whichever is longer, up to a maximum of 100 years. Although sea level rise could reduce Key silverside habitat and populations over the next several decades, the BRG did not include sea level rise as a threat in the biological status report because sea level rise is not expected to reduce the population size of Key silverside by 30% or greater in the next ten years (generation length is presumed to be less than one year). One reviewer noted the discrepancy between the IUCN's classification of the species (lower risk/near threatened) and our proposed classification of "threatened," and suggested that new information may have become available since their review (1996). The IUCN account (http://www.iucnredlist.org/apps/redlist/details/13145/0) does not provide documentation for their classification, but it does note that it needs updating. Peer reviews are available at MyFWC.com

## LITERATURE CITED


Bloom D.D., K.R. Piller, J. Lyons, N. Mercado-Silva, M. Medina-Nava. 2009. Systematics and biogeography of the silverside tribe Menidiini (Teleostomi: Antherinopsidae) based on the mitochondrial ND2 gene. Copeia 2009:408-417.

Conover, D.O., S. Munch, T.E. Lankford Jr. 2000. Current status of the Key silverside, *Menidia conchorum*, in southern Florida. U.S. Geological Survey. http://sero.nmfs.noaa.gov/pr/SOC/Revised%20SOC%20webpage%202010/Key%20Silverside/Menidia%20conchorum%20FINAL-1.pdf Cited 19 Oct 2010.

Duggins, C.F., A.A. Karlin, K. Relyea, R.W. Yerger. 1986. Systematics of the Key silverside, *Menidia conchorum*, with comments on other *Menidia* species (Pisces: Antheridnidae). Tulane Studies in Zoology and Botany 25:133-150.

Getter, C.D. 1981. Ecology and survival of the key silverside, Menidia conchorum, an atherinid fish endemic to the Florida Keys. PhD dissertation, University of Miami, Miami, FL.

Gilbert, C.R. 1978. *Menidia conchorum*. In: Rare and Endangered Biota of Florida. P.C.H. Prichard, Series Editor. 4: Fishes. University Presses of Florida.

# Biological Status Review Information
Findings

| | |
|---|---|
| Species/taxon: | Key silverside |
| Date: | 11/18/10 |
| Assessors: | Martha Bademan, Grant Gilmore, George Burgess |
| Generation length: | <1 year (Getter 1981) |

| 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] | do not have sufficient information | | 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] | do not have sufficient information | | 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] | do not have sufficient information | | 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] | do not have sufficient information | | 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 | endemic semi-enclosed lagoons and ponds in lower and middle Keys - Approximate EOO is 400 square miles | inferred | Y | Getter 1981, Duggins 1986, Conover et al. 2000 |
| (b)2. Area of occupancy < 2,000 $km^2$ (772 $mi^2$ ) | endemic semi-enclosed lagoons and ponds in lower and middle Keys | inferred | Y | Getter 1981, Duggins 1986, Conover et al. 2000 |
| AND at least 2 of the following: | | | | |
| a. Severely fragmented or exist in ≤ 10 locations | severely fragmented | estimated | Y | Getter 1981, Duggins 1986, Conover et al. 2000 |

| | | | | |
|---|---|---|---|---|
| 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 | loss of habitat, introduced species, decline in water quality | estimated | Y for iii | Getter 1981, Conover et al. 2000 |
| 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 - fluctuations, but not "extreme" by IUCN standards | estimated | N | Getter 1981 |
| **(C) Population Size and Trend** | | | | |
| Population size estimate to number fewer than 10,000 mature individuals AND EITHER | Abundant where it is found; >2600 sampled over six day period by Conover (2000) | estimated | N | Getter 1981, Duggins 1986, Conover et al. 2000 |
| (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 | | | N/A | |
| (c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following: | | | N/A | |
| a. Population structure in the form of EITHER | | | N/A | |
| (i) No subpopulation estimated to contain more than 1000 mature individuals; OR | | | | |
| (ii) All mature individuals are in one subpopulation | | | N/A | |
| b. Extreme fluctuations in number of mature individuals | | | N/A | |
| **(D) Population Very Small or Restricted**, EITHER | | | | |
| (d)1. Population estimated to number fewer than 1,000 mature individuals; OR | Abundant where it is found; Conover (2000) captured >2600 over 6 days | estimated | N | Getter 1981, Conover et al. 2000 |
| (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 | AOO is greater than 8 sq mi; more than 10 locations | estimated | N | Getter 1981, Duggins 1986, Conover et al. 2000 |
| **(E) Quantitative Analyses** | | | | |
| e1. Showing the probability of extinction in the wild is at least 10% within 100 years | no quantitative analysis | | N/A | |

| | |
|---|---|
| Initial 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 criteria for listing | B: b(1), b(2) + a, b(iii) |
| | |
| Is species/taxon endemic to Florida? (Y/N) | Yes |
| 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 criteria for listing | B: b(1), b(2) + a, b(iii) |

**Additional Notes**: The available genetic studies are inadequate for determining the taxonomic status of the Key silverside. Detailed study of the Florida populations of *Menidia peninsulae* and *M. conchorum* are needed to determine if they are separate species and to understand the continuity of variation throughout their range. If the Key silverside is actually a subspecies or population of *M. peninsulae*, is the Key silverside variation extreme or are there other distinct populations of *M. peninsulae* throughout their range? Clinal variation is common for *Menidia* silversides. Distribution and evolutionary processes are similarly shown in other related forms (*Fundulus*, Killifishes, sheepshead minnow); there may be populations of other species that will be worthy of listing review in the future.

**APPENDIX 1. Brief biographies of the Key silverside Biological Review Group members.**

**Martha Bademan** has a B.S. in biology from Wake Forest University and a M.S. in marine biology from Florida Institute of Technology. She has worked in the FWC's Division of Marine Fisheries Management, Analysis and Rulemaking Subsection since 2008. As an Environmental Specialist, she has analyzed fishery information for the management of several of Florida's recreational, commercial, and ornamental fish and invertebrate species.

**George Burgess** is Director of the Florida Program for Shark Research at the Florida Museum of Natural History, Gainesville. He is a specialist in fisheries conservation, ecology, and biogeography, with a particular focus on icthyofauna of South Florida. Mr. Burgess earned his MS at the University of Florida, and has numerous peer-reviewed publications to his credit. George also manages the National Sawfish Encounter database.

**R. Grant Gilmore** received his Ph.D., from the Florida Institute of Technology in 1988. Dr. Gilmore is a Senior Scientist with Estuarine, Coastal and Ocean Science, Inc., (ECOS). Dr. Gilmore founded ECOS in 2004 after spending 32 years with the Harbor Branch Oceanographic Institution, Fort Pierce, Florida and Dynamac Corp. at the Kennedy Space Center. Dr. Gilmore has been studying the fish community and ecology of Florida and Caribbean Sea for the past 35 years and has published over 70 technical and popular papers on fish ecology and life history including reproductive habits of spotted seatrout, snook, groupers, and sharks.

**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 information about this species was received during the public information request period.