Supplemental Information for the Worthington's Marsh Wren 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

Table of Contents

Peer review #1 from Tylan Dean

From: Tylan_Dean@fws.gov
To: Imperiled
Cc: Delany, Michael
Subject: Re: FW: Marian"s marsh wren BSR report
Date: Thursday, January 27, 2011 10:38:25 PM
Attachments: 20110126 Dean Peer Review of Draft Worthington"s Marsh Wren Biological Status Review.docx
20110126 Dean Peer Review of Draft Marian"s Marsh Wren Biological Status Review.docx

Oops - I just realized that I sent the Worthington's review instead of the Marian's in the last e-mail. Here are both of my brief reviews. Please contact me with any questions.

(See attached file: 20110126 Dean Peer Review of Draft Worthington's Marsh Wren Biological Status Review.docx)(See attached file: 20110126 Dean Peer Review of Draft Marian's Marsh Wren Biological Status Review.docx)

Tylan Dean
Assistant Supervisor
Endangered Species & Conservation Planning Assistance
U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, Virginia 23061

Peer Review of Draft FWC Biological Status Review for the Worthington's Marsh Wren (*Cistothorus palustris griseus*)
Reviewer: Tylan Dean

Thank you for the opportunity to review this document.
It appears to consider the appropriate (though limited) information, and the information considered appears to support the need for protection within Florida. From the narrative, it is unclear that the designation is proposed as a distinct population or as a regional population, and I recommend adding clarification in the narrative, including explanation of the reason why immigration from nearby populations is not expected. Because the marsh wrens are patchily distributed and may be presumed to interact as a metapopulation, it is unclear why immigration is identified as "do not know" instead of yes. I recommend reconsidering this. If no immigration is expected, it may be plausible to consider listing as a distinct population.

Peer review #2 from Craig Parenteau

From: Parenteau, Craig
To: Imperiled
Subject: Biological Status Reviews for Worthington"s and Marian"s Marsh Wrens
Date: Monday, January 10, 2011 6:27:51 PM

Dr. Haubold: I thank you for providing me with the opportunity to act as an independent peer reviewer of Biological Status Reviews developed by FWC for marsh wrens. I offer the following comments.

Worthington's Marsh Wren

I certainly agree with the conclusion of the Biological Review Group and FWC staff that the Worthington's marsh wren meets established criteria for listing and merits retention on the FWC list of threatened species. Although information regarding the status of marsh wren populations in Florida is unfortunately limited, what is available does highlight some worrisome trends. Most alarming is the apparent extirpation of Worthington's marsh wren from tidal marshes south of the St. Johns River. Also of concern are the 26% decline in breeding pairs over the 25-year period from 1976 to 2001, the loss of 40% of the salt marsh along Florida's northeast coast, and the continuing decline in condition of the remaining marshes. Even state-owned tidal marshland is not immune to significant perturbation. For example, on the southwestern side of Amelia Island from SR A1A north past Walker Creek to Sea Marsh Road, in an area encompassing about 875 acres of state-owned tidal marsh, there are currently at least 30 private boardwalks and piers/docks (many with multiple boat slips) that cross the marsh to access deeper water. One of the docks is 650 feet long and has eight boat slips at its terminus. I doubt anyone really knows how these structures might affect the breeding success of wrens in favored tidal creek habitats, but possible outcomes may include territory abandonment due to human disturbance and nest failure due to increased predation from raccoons. Additional study of marsh wren populations is needed, with point count surveys every five years representing the minimum effort recommended.

Thanks again for the opportunity to comment.
Craig Parenteau
Environmental Specialist III
FDEP, Division of Recreation and Parks
Bureau of Parks District 2
4801 Camp Ranch Road
Gainesville, FL 32641-9299

Peer review #3 from Dr. Don Kroodsma

From: Don Kroodsma
To: Imperiled
Subject: Re: Worthington"s marsh wren Draft BSR Report
Date: Thursday, November 18, 2010 11:02:57 AM
Attachments: Worthington"s Marsh Wren Final Draft BSR 11-12-10.doc

Hi Elsa:

I've read over the Draft Report (but not the several guidelines that were also sent). Pretty tough to get good data on this subspecies. Decline is inevitable in a coastal species, I would think, and the inferences seem valid, though are based on Kale's rough estimate of 1000-2000 pairs back in the 1960s. I wonder how rough that estimate was? Was it just a guess. Herb was a pretty careful guy, but he might have just waved his arms and come up with this number. That's probably worth looking at, to see what his number is based on.

I have attached the Report with a few comments written on it. My responses feel pretty skimpy, but that's about all I have in my head, I fear.

Kind regards . . . Don Kroodsma

Biological Status Review
for the
Worthington's Marsh Wren
(*Cistothorus palustris griseus)*

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 Worthington's marsh wren was sought from September 17 to November 1, 2010. The three-member Biological Review Group (BRG) met on November 3 – 4, 2010. Group members were Michael F. Delany (FWC lead), Katy NeSmith (Zoologist with the Florida Natural Areas Inventory), and Bill Pranty (Avian Ecologist Contractor). In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the Biological Review Group was charged with evaluating the biological status of the Worthington's marsh wren using criteria included in definitions in 68A-27.001(3), 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://www.myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Biological Review Group concluded from the biological assessment that the Worthington's marsh wren met criteria for listing, and FWC staff recommends retaining the species on the FWC list of threatened species. But all organizations, to my knowledge, do not list it as a "species," but rather a "subspecies."

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

BIOLOGICAL INFORMATION

Life History References – Welter (1935), Kale (1965, 1996), Barclay and Leonard (1985), Stevenson and Anderson (1994), Kroodsma and Verner (1997).

Taxonomic Classification – Marsh wrens (*Cistothorus palustris*) are in the Order Passeriformes assigned to the Family Troglodytidae (Wrens). About 14 subspecies are recognized. Subspecies designation is complex, being based on plumage, wing length, and geographic lines. Two distinct evolutionary groups, eastern and western, may warrant species status (Kroodsma and Verner 1997). Two subspecies, the Marian's marsh wren (*C. p. mariane*) and the Worthington's marsh wren (*C. p. griseus*), breed in Florida. The Worthington's marsh wren was described by Brewster (1893) from "some odd looking marsh wrens" collected by W. W. Worthington on Sapelo Island, Georgia in 1887. Compared to other subspecies the plumage of the Worthington's marsh wren is paler and more gray. Wheeler (1931) describes the taxonomic history and early distribution of marsh wrens in the Southeast.

Population Status and Trend – Difficulty in conducting surveys in relatively inaccessible salt marsh has limited monitoring, and historic information on abundance is sparse. Kale (1996) estimated 1,000-2,000 pairs during surveys conducted in 1975-1976. Surveys by McDonald (1988) from 1987-1988 found stable populations. NeSmith and Jue (2003) conducted surveys from 2000-2001 and observed 741 males. The range contraction of the Worthington's marsh wren from Volusia County to the St. Johns River (Stevenson and Anderson 1994, Kale 1996, NeSmith and Jue 2003) represents an estimated 40 percent decrease in extent of occurrence. A consequent population decline is suspected. Although results are based on only 7 routes and may be imprecise for trend estimates, information from the North American Breeding Bird Survey (BBS 2010) indicate a 9.5 percent annual decline Annually, that is enormous, over 40 years. If 9.5% is lost every year, what percentage is left after 40 years? Just a tiny fraction of the original, isn't it? The numbers don't seem reliable to me. in the abundance of marsh wrens in the southeastern coastal plain from 1966-2006. The FWC list of species of greatest conservation need (FWC 2005) ranks the abundance status of the Worthington's marsh wren as "medium" with a trend status of "stable." Pretty contradictory to be "stable" and to lose 9.5% annually. The Florida Natural Areas Inventory ranks the Worthington's marsh wren as rare and restricted in distribution globally but it always has been, and imperiled in distribution in Florida but to make sense of that statement, one would have to know the historic distribution in Florida. It might always have been rare and imperiled? (G5T3/S2). The International Union for the Conservation of Nature (IUCN 2009) ranks the global status of marsh wrens as a species of Least Concern. Point count stations established by NeSmith and Jue (2003) should be surveyed at 5-year intervals to monitor trends in abundance.

Geographic Range and Distribution – Marsh wrens breed in brackish and freshwater marshes of North America from the western and northern continental United States and southern Canada; along the Atlantic coast from Delaware to northern Florida; and along the Gulf coast from mid-peninsula Florida to southern Texas and into Mexico (Kroodsma and Verner 1997). The Marian's marsh wren breeds along the Gulf coast of Florida from Port Richey (Pasco County) to Escambia Bay (Santa Rosa County), and west into southwest Alabama (Stevenson and Anderson 1994, Kale 1996). The Worthington's marsh wren is a resident of salt marshes on the Atlantic coast from South Carolina to the St. Johns River (Duval County, Florida) (Kroodsma and Verner 1997, NeSmith and Jue 2003). Worthington's marsh wrens inhabit tidal marshes dominated by cordgrass (*Spartina alterniflora*) and nest in taller cordgrass along tidal creeks. The wren was formerly found south to New Smyrna, but may have been extirpated due to mangrove invasion (Nicholson 1950). The disappearance of the Worthington's marsh wren from apparently suitable habitat from Matanzas Inlet (St. Johns County) north to the St. Johns River is unexplained (Stevenson and Anderson 1994, Kale 1996, NeSmith and Jue 2003). Florida land cover information (Water Management Districts, photography dates 1999-2008) indicates 200.1-330.3 km^2 of salt marsh habitat within the range of the Worthington's marsh wren. The Florida Breeding Bird Atlas (FWC 2003, 1986-1991) documented confirmed breeding in 6 atlas blocks within the wren's current range. The subspecies is resident at breeding locations and considered non-migratory. The range of the Worthington's marsh wren extends north into South Carolina, with Florida constituting about 10 percent of the subspecies' range.

Quantitative Analyses – A population viability analysis has not been conducted for the Florida population of the Worthington's marsh wren.

BIOLOGICAL STATUS ASSESSMENT

Threats – The narrow coastal range of the Worthington's marsh wren in Florida makes it vulnerable to habitat loss and fragmentation due to dredging and filling in conjunction with coastal development, impoundments for mosquito control and waterfowl, flooding from severe storms and hydrological changes, sea level rise, chemical and oil spills, and disposal of dredged material (Montague and Wiegert 1990, FWC 2005). Development of adjacent uplands may contribute to habitat ~~degredation~~degradation. The vulnerability of coastal song birds is exemplified by the rapid decline and extinction of the dusky seaside sparrow (*Ammodramus maritimus nigrescens*) (Delany et al. 1981). Climate change is a potential threat at the southern extent of its range where salt marsh habitat may be lost to the invasion of mangroves as the climate warms (Stevenson and Anderson 1994). Sea level rise also may lead to habitat loss for the Worthington's marsh wren in Florida (Walton 2007). However, responses of most species, especially short-lived species, to future climate change are not understood well enough to predict impacts (Akcakaya et al. 2006). The current condition of salt marsh habitat in Florida is considered "poor and declining" (FWC 2005), but strict regulatory mechanisms and public ownership provide some protection. High tides destroyed up to 21 percent of nests during a four year study in Georgia (Kale 1965), where rice rats (*Oryzomys palustris*), raccoons (*Procyon lotor*), and mink (*Mustela vison*) depredated up to 81 percent of nests. Nests sites also may be usurped by rice rats (Stevenson and Anderson 1994).

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In our review of the status of the Worthington's marsh wren, the BRG made the following assumptions and conclusions:

1. Because the time estimated for 3 generations was <10 years, the IUCN criteria (2010) stipulation of 10 years was used in assessments.

2. Early estimates of the number of mature individuals ranged from 1,000-2,000 pairs (Kale 1996).

3. More recent surveys (2000-2001) indicated a decline in abundance (NeSmith and Jue 2003).

4. The extent of occurrence was 200.1-330.3 km^2 based on the availability of salt marsh habitat within the range of the wren. NeSmith and Jue (2003) estimated 124 km^2 of potential habitat in northeast Florida.

5. There is evidence of a 40 percent range contraction at the southernmost extent of the subspecies range in Florida. A consequent population decline is suspected.

6. ~~Adult~~Juvenile? marsh wrens I don't think that adults in sedentary populations are as likely to disperse.will disperse to locate suitable habitat (Kroodsma and Verner 1997). However, because of the failure of the Worthington's marsh wren to recolonize habitat south of the St. Johns River a rescue effect from extra-regional populations seems unlikely.

7. The condition of salt marsh habitat in Florida is considered to be "poor and declining" (FWC 2005).

LISTING RECOMMENDATION

Staff recommends that the Worthington's marsh wren be listed as a Threatened species because the subspecies meets criteria for listing as described in 68A-27.001(3), F. A. C. I guess I'm confused by the species and subspecies arguments . . .

SUMMARY OF THE INDEPENDENT REVIEW

LITERATURE CITED

Akcakaya, H. R., S. H. M. Butchart, G. M. Mace, S. N. Stuart, and C. Hilton-Taylor. 2006. Use and misuse of the IUCN Red List criteria in projecting climate change impacts on biodiversity. Global Change Biology 12:2037-2043.

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Wheeler, H. E. 1931. The status, breeding range, and habits of Marian's marsh wren. Wilson Bulletin 38:247-267.

Peer review #4 from Paul Sykes

From: Paul Sykes
To: Imperiled
Subject: Re: Worthington"s marsh wren Draft BSR Report
Date: Thursday, December 02, 2010 3:25:20 PM

Dear Elsa:

Thank you for the opportunity to review the two marsh wren BSR drafts. I found them to be interesting and informative. The BSRs for the Worthington's and Marian's Marsh Wrens are perfectly adequate for their intended purpose despite the fact relatively little is known of these taxons. I find the accounts "clean", well written and organized, and are accurate to the best of my knowledge. The literate for each taxon is well covered. In my opinion, the three authors did a very good job in drafting these accounts and I have nothing further to offer to improve what is presented.

Paul W. Sykes, Jr.

Peer review #5 from Sally Jue

To: Mike Delany
From: Sally S. Jue
Date: 9 January 2011
Re: Peer review of the Biological Status Review for the Worthington's Marsh Wren (*Cistothorus palustris griseus)*

Thank you for the opportunity to participate in the peer review process for the State's Biological Status Review (BSR) for the two marsh wren subspecies. I have carefully reviewed the BSR for Worthington's marsh wren and concur with the findings and recommendation of the Biological Review Group (BRG) to retain this taxon on the list of Threatened species.
All available biological information and data have been accurately assessed. The BRG members did a systematic review and step-wise analysis of the available information relative to each of the listing criteria. Their assumptions and interpretations are backed up with references from the literature, and their resulting conclusions are valid. Available data indicate the subspecies meets three of the five criteria for listing. Its restricted and contracting geographic range, coupled with declining quality and multiple threats to the salt marsh habitat on which it depends, make monitoring studies of the Worthington's marsh wren essential to understanding this taxon's population status and trends.

Biological Status Review
for the
Worthington's Marsh Wren
(*Cistothorus palustris griseus)*

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BIOLOGICAL STATUS ASSESSMENT

Threats – The narrow coastal range of the Worthington's marsh wren in Florida makes it vulnerable to habitat loss and fragmentation due to dredging and filling in conjunction with coastal development, impoundments for mosquito control and waterfowl, flooding from severe

storms and hydrological changes, sea level rise, chemical and oil spills, and disposal of dredged material (Montague and Wiegert 1990, FWC 2005). Development of adjacent uplands may contribute to habitat degredation. The vulnerability of coastal song birds is exemplified by the rapid decline and extinction of the dusky seaside sparrow (*Ammodramus maritimus nigrescens*) (Delany et al. 1981). Climate change is a potential threat at the southern extent of its range where salt marsh habitat may be lost to the invasion of mangroves as the climate warms (Stevenson and Anderson 1994). Sea level rise also may lead to habitat loss for the Worthington's marsh wren in Florida (Walton 2007). However, responses of most species, especially short-lived species, to future climate change are not understood well enough to predict impacts (Akcakaya et al. 2006). The current condition of salt marsh habitat in Florida is considered "poor and declining" (FWC 2005), but strict regulatory mechanisms and public ownership provide some protection. High tides destroyed up to 21 percent of marsh wren nests during a four year study in Georgia (Kale 1965), where rice rats (*Oryzomys palustris*), raccoons (*Procyon lotor*), and mink (*Mustela vison*) depredated up to 81 percent of nests. Nests sites also may be usurped by rice rats (Stevenson and Anderson 1994).

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5. There is evidence of a 40 percent range contraction at the southernmost extent of the subspecies range in Florida. A consequent population decline is suspected.

6. Adult marsh wrens will disperse to locate suitable habitat (Kroodsma and Verner 1997). However, because of the failure of the Worthington's marsh wren to recolonize habitat

south of the St. Johns River, a rescue effect from extra-regional populations seems unlikely.

7. The condition of salt marsh habitat in Florida is considered to be “poor and declining” (FWC 2005).

LISTING RECOMMENDATION

Staff recommends that the Worthington’s marsh wren be listed as a Threatened species because the subspecies meets criteria for listing as described in 68A-27.001(3), F. A. C.

SUMMARY OF THE INDEPENDENT REVIEW

LITERATURE CITED

Akcakaya, H. R., S. H. M. Butchart, G. M. Mace, S. N. Stuart, and C. Hilton-Taylor. 2006. Use and misuse of the IUCN Red List criteria in projecting climate change impacts on biodiversity. Global Change Biology 12:2037-2043.

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Copy of the Worthington's marsh wren BSR draft report that was sent out for peer review

Biological Status Review
for the
Worthington's Marsh Wren
(*Cistothorus palustris griseus)*

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 Worthington's marsh wren was sought from September 17 to November 1, 2010. The three-member Biological Review Group (BRG) met on November 3 – 4, 2010. Group members were Michael F. Delany (FWC lead), Katy NeSmith (Zoologist with the Florida Natural Areas Inventory), and Bill Pranty (Avian Ecologist Contractor). In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the Biological Review Group was charged with evaluating the biological status of the Worthington's marsh wren using criteria included in definitions in 68A-27.001(3), 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://www.myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Biological Review Group concluded from the biological assessment that the Worthington's marsh wren met criteria for listing, and FWC staff recommends retaining the species on the FWC list of threatened species.

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

BIOLOGICAL INFORMATION

Life History References – Welter (1935), Kale (1965, 1996), Barclay and Leonard (1985), Stevenson and Anderson (1994), Kroodsma and Verner (1997).

Taxonomic Classification – Marsh wrens (*Cistothorus palustris*) are in the Order Passeriformes assigned to the Family Troglodytidae (Wrens). About 14 subspecies are recognized. Subspecies designation is complex, being based on plumage, wing length, and geographic lines. Two distinct evolutionary groups, eastern and western, may warrant species status (Kroodsma and Verner 1997). Two subspecies, the Marian's marsh wren (*C. p. mariane*) and the Worthington's marsh wren (*C. p. griseus*), breed in Florida. The Worthington's marsh wren was described by Brewster (1893) from "some odd looking marsh wrens" collected by W. W. Worthington on Sapelo Island, Georgia in 1887. Compared to other subspecies the plumage of the Worthington's marsh wren is paler and more gray. Wheeler (1931) describes the taxonomic history and early distribution of marsh wrens in the Southeast.

Population Status and Trend – Difficulty in conducting surveys in relatively inaccessible salt marsh has limited monitoring, and historic information on abundance is sparse. Kale (1996) estimated 1,000-2,000 pairs during surveys conducted in 1975-1976. Surveys by McDonald (1988) from 1987-1988 found stable populations. NeSmith and Jue (2003) conducted surveys from 2000-2001 and observed 741 males. The range contraction of the Worthington's marsh wren from Volusia County to the St. Johns River (Stevenson and Anderson 1994, Kale 1996, NeSmith and Jue 2003) represents an estimated 40 percent decrease in extent of occurrence. A consequent population decline is suspected. Although results are based on only 7 routes and may be imprecise for trend estimates, information from the North American Breeding Bird Survey (BBS 2010) indicate a -9.5 percent annual decline in the abundance of marsh wrens in the southeastern coastal plain from 1966-2006. The FWC list of species of greatest conservation need (FWC 2005) ranks the abundance status of the Worthington's marsh wren as "medium" with a trend status of "stable." The Florida Natural Areas Inventory ranks the Worthington's marsh wren as rare and restricted in distribution globally, and imperiled in distribution in Florida (G5T3/S2). The International Union for the Conservation of Nature (IUCN 2009) ranks the global status of marsh wrens as a species of Least Concern. Point count stations established by NeSmith and Jue (2003) should be surveyed at 5-year intervals to monitor trends in abundance.

Geographic Range and Distribution – Marsh wrens breed in brackish and freshwater marshes of North America from the western and northern continental United States and southern Canada; along the Atlantic coast from Delaware to northern Florida; and along the Gulf coast from mid-peninsula Florida to southern Texas and into Mexico (Kroodsma and Verner 1997). The Marian's marsh wren breeds along the Gulf coast of Florida from Port Richey (Pasco County) to Escambia Bay (Santa Rosa County), and west into southwest Alabama (Stevenson and Anderson 1994, Kale 1996). The Worthington's marsh wren is a resident of salt marshes on the Atlantic coast from South Carolina to the St. Johns River (Duval County, Florida) (Kroodsma and Verner 1997, NeSmith and Jue 2003). Worthington's marsh wrens inhabit tidal marshes dominated by cordgrass (*Spartina alterniflora*) and nest in taller cordgrass along tidal creeks. The wren was formerly found south to New Smyrna, but may have been extirpated due to mangrove invasion (Nicholson 1950). The disappearance of the Worthington's marsh wren from apparently suitable habitat from Matanzas Inlet (St. Johns County) north to the St. Johns River is unexplained (Stevenson and Anderson 1994, Kale 1996, NeSmith and Jue 2003). Florida land cover information (Water Management Districts, photography dates 1999-2008) indicates 200.1-330.3 km^2 of salt marsh habitat within the range of the Worthington's marsh wren. The Florida Breeding Bird Atlas (FWC 2003, 1986-1991) documented confirmed breeding in 6 atlas blocks within the wren's current range. The subspecies is resident at breeding locations and considered non-migratory. The range of the Worthington's marsh wren extends north into South Carolina, with Florida constituting about 10 percent of the subspecies' range.

Quantitative Analyses – A population viability analysis has not been conducted for the Florida population of the Worthington's marsh wren.

BIOLOGICAL STATUS ASSESSMENT

Threats – The narrow coastal range of the Worthington's marsh wren in Florida makes it vulnerable to habitat loss and fragmentation due to dredging and filling in conjunction with coastal development, impoundments for mosquito control and waterfowl, flooding from severe storms and hydrological changes, sea level rise, chemical and oil spills, and disposal of dredged material (Montague and Wiegert 1990, FWC 2005). Development of adjacent uplands may contribute to habitat degredation. The vulnerability of coastal song birds is exemplified by the rapid decline and extinction of the dusky seaside sparrow (*Ammodramus maritimus nigrescens*) (Delany et al. 1981). Climate change is a potential threat at the southern extent of its range where salt marsh habitat may be lost to the invasion of mangroves as the climate warms (Stevenson and Anderson 1994). Sea level rise also may lead to habitat loss for the Worthington's marsh wren in Florida (Walton 2007). However, responses of most species, especially short-lived species, to future climate change are not understood well enough to predict impacts (Akcakaya et al. 2006). The current condition of salt marsh habitat in Florida is considered "poor and declining" (FWC 2005), but strict regulatory mechanisms and public ownership provide some protection. High tides destroyed up to 21 percent of nests during a four year study in Georgia (Kale 1965), where rice rats (*Oryzomys palustris*), raccoons (*Procyon lotor*), and mink (*Mustela vison*) depredated up to 81 percent of nests. Nests sites also may be usurped by rice rats (Stevenson and Anderson 1994).

Statewide Population Assessment – The IUCN developed criteria for the evaluation of extinction risk for any taxon, with the exception of micro-organisms (IUCN 2010). Each taxon must be assessed against all criteria, but if the taxon meets any of the criteria under a particular category it qualifies as threatened. IUCN criteria use the terms *observed*, *estimated*, *projected*, *inferred*, and *suspected* to refer to the quality of information used to assess the status of a species. The assessment criteria can be applied at a regional (Florida) level with a consideration of the status and impact of extra-regional populations (IUCN 2003). Findings from the BRG are included in the Biological Status Review Information tables below.

In our review of the status of the Worthington's marsh wren, the BRG made the following assumptions and conclusions:

8. Because the time estimated for 3 generations was <10 years, the IUCN criteria (2010) stipulation of 10 years was used in assessments.

9. Early estimates of the number of mature individuals ranged from 1,000-2,000 pairs (Kale 1996).

10. More recent surveys (2000-2001) indicated a decline in abundance (NeSmith and Jue 2003).

11. The extent of occurrence was 200.1-330.3 km^2 based on the availability of salt marsh habitat within the range of the wren. NeSmith and Jue (2003) estimated 124 km^2 of potential habitat in northeast Florida.

12. There is evidence of a 40 percent range contraction at the southernmost extent of the subspecies range in Florida. A consequent population decline is suspected.

13. Adult marsh wrens will disperse to locate suitable habitat (Kroodsma and Verner 1997). However, because of the failure of the Worthington's marsh wren to recolonize habitat south of the St. Johns River a rescue effect from extra-regional populations seems unlikely.

14. The condition of salt marsh habitat in Florida is considered to be "poor and declining" (FWC 2005).

LISTING RECOMMENDATION

Staff recommends that the Worthington's marsh wren be listed as a Threatened species because the subspecies meets criteria for listing as described in 68A-27.001(3), F. A. C.

SUMMARY OF THE INDEPENDENT REVIEW

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Biological Status Review Information Findings	Species/taxon:	Worthington's Marsh Wren
	Date:	11/03/10
	Assessors:	Michael Delany, Katy NeSmith, and Bill Pranty
	Generation length:	Estimated <3 years; IUCN 10-year period was used

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]	not available			
(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]	not available			
(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]	not available			
(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]	not available			
[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	200.1 km^2 of potential salt marsh within range	E	Y	St. Johns River Water Management District, photography dates 1999-2008
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	not available			

AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	Exists in one location that is threatened by a single event such as a hurricane or oil/chemical spill	I	Y	FWC (2003), NeSmith and Jue (2003)
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	(i ii, iii, iv, and v). A range contraction of 40% (from 330.3 to 200.1 km2) of salt marsh habitat infers a population reduction. 741 males detected in 2000-2001 versus 1000-2000 pairs estimated in 1975-1976 indicates a decline of 26%; (iii) The current condition of salt marsh habitat in Florida is poor and declining.	O/E/I	Y	Kale (1996), NeSmith and Jue (2003), FWC (2005)
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	unknown			
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	1000-2000 pairs estimated in 1975-1976; 741 singing males observed (741 pairs inferred) in 2000-2001	O/E	Y	Kale (1996), NeSmith and Jue (2003)
(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	not available			
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	741 singing males observed (741 pairs inferred) in 2000-2001 represents an estimated decline of at least 26% from 1000-2000 pairs estimated in 1975-1976	O/E	Y	Kale (1996), NeSmith and Jue (2003)
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	All mature individuals in one intermixing subpopulation	I	Y	NeSmith and Jue (2003)
b. Extreme fluctuations in number of mature individuals	unknown			
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	741 singing males observed (741 pairs inferred) in 2000-2001	O	N	NeSmith and Jue (2003)
(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	Exists in one location that is prone to the effects of human activities or stochastic events within a short time period in an uncertain future	I	Y	FWC (2003), NeSmith and Jue (2003)

(E) Quantitative Analyses	
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	not available
Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
Meets at least one of the criteria	B1(a)(b i, ii, iii, iv, v); C2(a ii); 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)
No change from initial finding	B1(a)(b i, ii, iii, iv, v); C2(a ii); D2

1	Biological Status Review Information Regional Assessment	Species/taxon: Worthington's Marsh Wren
2		Date: 11/3/10
3		Assessors: Michael Delany, Katy NeSmith, and Bill Pranty
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.	DK
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	
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 from initial finding

Appendix 1. Brief biographies of the members of the Wothington's marsh wren Biological Review Group.

Michael F. Delany (M.S., Wildlife Ecology, University of Maryland Appalachian Laboratory) is an Associate Research Scientist with the Florida Fish and Wildlife Conservation Commission (FWC). He started work with the FWC in 1979 and is the Florida coordinator for the U.S. Geological Survey's Breeding Bird Survey and the U.S. Fish and Wildlife Service's eastern painted bunting monitoring program. Mike is principal investigator for field studies of the endangered Florida grasshopper sparrow. Studies addressing management needs for grasshopper sparrows, dusky seaside sparrows, American alligators, and Northern bobwhite resulted in over 40 publications. He is a Certified Wildlife Biologist with the Wildlife Society.

Katy NeSmith (M.S., Biological Science, Florida State University) is a zoologist with the Florida Natural Areas Inventory (FNAI). Katy is responsible for collecting and processing rare animal occurrence data, concentrating on birds; conducting field surveys for rare animals (past surveys include seaside sparrow, marsh wren, limpkin, Florida scrub-jay, red-cockaded woodpecker, and gopher tortoise); and identifying, evaluating, and describing high priority natural areas in Florida. She has worked on county inventories and has been involved in several current and historic natural community mapping projects.

Bill Pranty is an avian ecologist who has studied Florida Scrub-Jays, Florida Grasshopper Sparrows, and Painted Buntings for the Florida Fish and Wildlife Conservation Commission and Archbold Biological Station. He compiles bird observations for the Florida Ornithological Society, and edits the Christmas Bird Counts in Florida for National Audubon. He is keenly interested in documenting Florida's avifauna, with an emphasis on rare and exotic species. Bill is the author of *A Birder's Guide to Florida* (American Birding Association 1996 and 2005), and co-author of *Birds of Florida* (Lone Pine Press 2006).

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.

Appendix 3. Information and Comments Received from Independent Reviewers.