

# **Florida Burrowing Owl 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  
Florida Burrowing Owl  
(*Athene cunicularia floridana*)  
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 Florida burrowing owl was sought from September 17 to November 1, 2010. The members of the Biological Review Group (BRG) met on November 12, 2010. Group members were Kate Haley (FWC lead), Jerry Jackson (Florida Gulf Coast University), and Ken Meyer (independent consultant) (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 Florida burrowing owl 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 this final report are available as supplemental materials at <http://myfwc.com/wildlifehabitats/imperiled/biological-status/>.

The burrowing owl BRG concluded from the biological assessment that the Florida burrowing owl met at least one listing criterion. Based on the literature review, information received from the public, and the BRG findings staff recommends the burrowing owl 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**

**Life History References** – Haug et al. (1993), FWC (2003), Millsap (1996) and USFWS (2003).

**Taxonomic Classification** – This report is for the Florida burrowing owl, *Athene cunicularia floridana* a subspecies of burrowing owl, in Florida. The subspecies is found in Florida and the Bahama Islands (Haug et al. 1993).

**Population Status and Trend** – Millsap (1996) estimated between 3,000 and 10,000 burrowing owls in Florida based on density estimates from different areas of the state. However, Bowen (2001) surveyed current and historic records of burrowing owls throughout the state and found 1,757 adult owls. Local establishment and extirpations make it difficult to determine the trend of the burrowing owl statewide (Woolfenden et al. 2006).

**Geographic Range and Distribution** – The Florida burrowing owl lives primarily in peninsular Florida although its distribution is localized and patchy, especially in the northern part of its range. Historically, the burrowing owl occupied the open native prairies of central Florida. Recently, the number of burrowing owls in these areas have decreased because of habitat loss. Burrowing owls in south Florida coastal areas have increased due to modification of habitat by people including clearing forests and draining wetlands. Burrowing owls inhabit cleared areas that offer short groundcover such as pastures, agricultural fields, golf courses, airports and vacant lots in residential areas.

**Quantitative Analyses** – Through population viability analyses (PVA) Endries et al. (2009) estimated the likelihood of extinction in all potential habitat and potential habitat on managed lands (both analyses excluded urban areas). Both models had similar results. For all potential habitat the probability of extinction was 0% in the next 100 years. There was a 23% probability of a high decline (>90%). Bowen (2000) conducted PVA to determine the viability of isolated burrowing owls (<5 individuals) and found >50% probability of extinction for these populations.

## **BIOLOGICAL STATUS ASSESSMENT**

**Threats** – The major threats to the Florida burrowing owl are reliance on human-altered habitats and loss of native habitat (Owre 1978, Millsap 1996). Burrowing owls can be found in high densities in urban and suburban areas (Millsap and Bear 2000). In these areas, preferred nesting habitat and burrows may be destroyed by construction activities, harassment by people, and domestic animals (e.g. dogs). Current management is limited to preventing the take of nests during the breeding season (FWC 2009) and Mrykalo et al. (2007) noted the lack of management strategies for burrowing owls in rural areas. This may be further compounded by limited access to occupied habitat (e.g. private lands). Most human-altered habitats, including those in rural areas (e.g. improved pasture), are not a priority for conservation (Mueller et al. 2007). Additional threats include a variety of ground and aerial predators that can harm eggs, young or adults. There is increasing concern about the prevalence of exotic predators like the Nile monitor and feral cats. A source of mortality of eggs and young is flooding of nests in burrows by heavy rains. Collisions with automobiles are a frequent cause of mortality for owls in suburban and urban areas.

**Population Assessment** - Findings from the Biological Review Group are included in a Biological Status Review information findings table.

## **LISTING RECOMMENDATION**

Staff recommends that the Florida burrowing owl be listed as a Threatened species because the species met a criterion for listing as described in 68A-27.001, F.A.C.

## **SUMMARY OF THE INDEPENDENT REVIEW**

Comments on the draft biological status review report were received from 4 reviewers, Brian A. Millsap (U. S. Fish and Wildlife Service), Pamela J. Bowen (St. Johns River Water Management District), Melissa M. Grigione (Pace University), and Daniel H. Catlin (Virginia Polytechnic Institute and State University). Appropriate editorial changes recommended by the reviewers were made to the report. Of the reviews, Bowen and Grigione concurred with the staff recommendations and Millsap and Catlin questioned how some of the criteria were interpreted in the review. Although there was debate by two of the reviewers over the use of the term “subpopulation” in the review, all the reviewers stated the BRG did a thorough review of the available literature for the burrowing owl and generally accepted the BRG’s conclusions and staff’s recommendation.

The Biological Review Group (BRG) had considerable discussion about the definition of a subpopulation as it relates to the listing criteria. While USFWS 2003 and Bowen 2001 refer to several subpopulations in Florida it is not the same term used in the IUCN criteria. From the IUCN staff, "The (term) ‘one subpopulation’ means that all the mature individuals are in a population that mixes and there is (or at least can be) interbreeding. So, there are no small groups separated by geographic or other barriers. If all 4,000 individuals are potentially able to mix then it can be considered as one subpopulation." The BRG did not find direct genetic or demographic evidence to support whether the burrowing owl is one subpopulation or many. Grigione offered a preliminary analysis of genetic work: “Sarno et al (In prep), using 13 microsatellite loci, are investigating genetic variation in 182 burrowing owls from 14 locations in Florida. To date we have observed a paucity of heterozygous individuals and presume that the Florida populations will exhibit low levels of genetic variation and heterozygosity.” This work may warrant including in the Biological Status Review when the data are more fully analyzed and could provide evidence that burrowing owls are isolated into several subpopulations. Besides the preliminary work by Sarno et al., only one other genetic study has been conducted for burrowing owls in Florida. Chandler et al. 2000 found exchange between subpopulations is restricted but due to problems with the methodology, the BRG decided that this study could not be used as evidence that burrowing owls are in several subpopulations. The BRG determined that available information for the burrowing owl does not indicate limited exchange of individuals throughout the state. The BRG concluded that the distribution in Florida is considered one subpopulation based on the potential and known mobility of individuals [Cape Coral owl found in Marco Island -- Mrykalo et al. 2007 found 10 km dispersal of an individual and Wellicome (et al. 1997) found natal dispersal distance up to 300 km (186 miles) in a migratory population in Canada]. Given the greatest observed distance between burrowing owl locations is 200 miles (Eglin Air Force Base to Madison County) it is reasonable to assume that even burrowing owls in isolated areas of Florida are capable of interbreeding with owls in other

areas. Our understanding of the burrowing owl ecology would greatly be advanced with a study of its metapopulation dynamics.

Two reviewers offered suggestions for how other criteria were possibly met. Catlin suggested the burrowing owl potentially met criterion E using the population viability analyses (PVA). The BRG discussed the results of both PVAs and determined the PVAs are only applicable to subsets of the state population and made a reasonable assumption that the rest of the population may remain viable even if those subsets go extinct. Bowen provided evidence for additional criteria (Criteria A and C) that would be met if the data were interpreted less conservatively (e.g. projected declines). Given these suggestions for additional criteria and the BRG's conclusion that the burrowing owl met criterion C2, listing the burrowing owl as threatened under the IUCN criteria is a precautionary approach. Peer reviews are available at [MyFWC.com](http://MyFWC.com).

## LITERATURE CITED

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# Biological Status Review Information Findings

Species/taxon: Florida burrowing owl

Date: 11/12/10

Assessors: Kate Haley, Ken Meyer, Jerry Jackson

Generation length:

10 yrs (generation time is 6-12 years so we used 10 years as the IUCN minimum: Haug et al. 1993 breed at 1 yr, adult survival 60% = avg age breeding adult 2 - 4 yrs)

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).				
<b>(A) Population Size Reduction, ANY of</b>				
(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 <sup>1</sup>	no numerical estimate of decline at state level (Breeding Bird Survey, Christmas Bird Count, Breeding Bird Atlas) but isolated evidence of local fluctuation and possible decline	I	N	USFWS 2003, N. Ritchie pers. comm.
(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 <sup>1</sup>	see above		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) <sup>1</sup>	see above but projected development in urban areas (which may equal 30-50% of state population) may cause decline		N	Millsap 2002, Conway et al. 2006
(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. <sup>1</sup>	see above		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>(B) Geographic Range, EITHER</b>				
(b)1. Extent of occurrence < 20,000 km <sup>2</sup> (7,722 mi <sup>2</sup> ) OR	> 20,000 km <sup>2</sup>	I	N	Bowen 2001, FWC 2003, Mueller et al. 2007
(b)2. Area of occupancy < 2,000 km <sup>2</sup> (772 mi <sup>2</sup> )	>3500 km <sup>2</sup> of potential habitat based on burrowing owl occurrences and dispersal distances of 1 km (this estimate is a minimum and does not include urban areas)	I	N	Endries et al. 2009
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations			N	



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	unknown - suspect increase in some areas and decrease in some areas	S	N	Millsap 1996, Woolfenden et al. 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			N	
<b>(C) Population Size and Trend</b>				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	clearly fewer than 10,000 (observed 1700+ Bowen/estimated 3,000-10,000 Millsap)	I	Y	Bowen 2001, Millsap 1996
(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	
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	projected decline is likely with increasing development, vulnerability to predation from exotic and feral species and collisions with automobiles. This may be further compounded by limited management access to occupied habitat (private lands) and use of habitat (e.g. improved pasture) not traditionally managed by public land managers or included in land acquisition priorities (Mueller et al. 2007). We assume land managers will have a decreased ability to manage lands (e.g. prescribed fire) with increasing urbanization. Endries et al. 2009 found high likelihood of decline in a PVA of rural owls.	I	Y	USFWS 2003, Mueller et al. 2007, Endries et al. 2009, Millsap 2002, Mealey 1997
a. Population structure in the form of EITHER	distribution in Florida is considered one subpopulation based on the known mobility of individuals (Cape Coral owl found in Marco Island, Mrykalo et al. 2007 found 10 km dispersal of an individual). We had considerable discussion about the definition of a subpopulation and while USFWS 2003 and Bowen 2001 refer to several subpopulations in Florida it is not the same term used in the IUCN criteria. Chandler et al. 2000 found exchange between subpopulations is restricted but due to problems with the methodology further study is needed.	I	Y	Chandler et al. 2000, Mrykalo et al. 2007, J. Jackson pers. comm., Bowen 2001, USFWS 2003
(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			N	
<b>(D) Population Very Small or Restricted, EITHER</b>				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR			N	

(d)2. Population with a very restricted area of occupancy (typically less than 20 km2 [8 mi2]) 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			N	
<b>(E) Quantitative Analyses</b>				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	results of both PVAs are only applicable to subsets of the state population (Endries to rural owls, Bowen to isolated burrowing owls - <5 individuals)	P	N	Endries et al. 2009, Bowen 2000
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)			
Does meet one of the criteria	C2a(ii)			
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)			
Does meet one of the criteria	C2a(ii)			

1	<p style="text-align: center;"><b>Biological Status Review Information</b> <b>Regional Assessment</b></p>	<u>Species/taxon:</u>	Florida burrowing owl
2		<u>Date:</u>	11/12/10
3		<u>Assessors:</u>	Kate Haley, Ken Meyer, Jerry Jackson
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/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		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		C2aii

**Additional Notes** - Clarification on IUCN definition of subpopulation from the IUCN staff - "The (term) 'one subpopulation' means that all the mature individuals are in a population that mixes and there is (or at least can be) interbreeding. So, there are no small groups separated by geographic or other barriers. If all 4,000 individuals are potentially able to mix then it can be considered as one subpopulation."

This assessment is different from the IUCN Red List assessment of the burrowing owl because we assessed the floridana subspecies. IUCN assessed the burrowing owl at the species-level.

## **APPENDIX 1: Brief biographies of the Florida burrowing owl Biological Review Group members**

**Katherin Haley** is currently Coordinator for the Florida Wildlife Legacy Initiative, FWC, supervising a diverse set of staff and conservation, research, and management programs. Haley has more than a decade of research experience with burrowing owls in California and Florida, including a long-term study of Florida Burrowing Owl demography and dispersal in southwest Florida.

**Jerome A. Jackson**, Ph.D., is Professor of Marine and Ecological Sciences and former Whitaker Eminent Scholar in Science at Florida Gulf Coast University. Jackson is a Fellow of the American Ornithologists' Union and Past President of the Wilson Ornithological Society, the Association of Field Ornithologists, the Mississippi Ornithological Society, and the Florida Ornithological Society. Jackson's field of expertise is the behavioral ecology of birds. He is the author/editor of 23 books and many dozens of papers in scientific journals and proceedings.

**Kenneth D. Meyer**, Ph.D., is Director and Research Ecologist for the Avian Research and Conservation Institute. Meyer has conducted research on the behavioral ecology, migration, and population status of some of Florida's most imperiled and area-restricted bird species, including the swallow-tailed kite, short-tailed hawk, and white-crowned Pigeon. Meyer also serves as adjunct faculty member in the Department of Wildlife Ecology and Conservation at the University of Florida.

## **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.**

**Letter from Nancy J. Ritchie**, Environmental Specialist, City of Marco Island, Collier County, Marco Island, Florida, dated October 19, 2010. Ms. Ritchie provided the population numbers for the Florida burrowing owl on Marco Island, Collier County. A decline in the population was reported.

**Email from Lori Blydenburg**, City of Cape Coral, Cape Coral, Florida, dated October 29, 2010. Ms. Blydenburg provided a copy of the draft Florida Burrowing Owl Adaptive Management Plan prepared by Quest Ecology May 2010. The plan provides information on burrowing owl natural history, its distribution and abundance in Cape Coral, managing habitat in Cape Coral, and includes an adaptive management plan and a recommended initial management plan.

**Email from Katherin Haley**, Initiative Coordinator, Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida 32399, dated October 27, 2010. Ms. Haley provided a field season progress report and a conference poster for the Effectiveness of Burrowing Owl Conservation Measures project.

Haley, K.L., C.L. Bear, T. Allen, S. Smiley, B.J. Gruver, and B.A. Millsap. 2004. Effectiveness of burrowing owl conservation measures: annual report 2003-04. Florida Fish and Wildlife Conservation Commission. Tallahassee, FL U.S.A.

Haley, K.L., B.A. Millsap, C.L. Bear, and E.K. McConnell. 2002. Effectiveness of burrowing owl conservation measures. Poster presented at the Third North American Ornithological Conference. New Orleans, LA U.S.A

**Letter from Amber Crooks**, Natural Resource Specialist, Conservancy of Southwest Florida, Naples, Florida, dated October 25, 2010. Ms. Crooks expressed concerns about the use of IUCN criteria for the status review, identified several statewide threats to imperiled species (degradation of water resources and loss of uplands), and reported a decline in the number of burrowing owls in Cape Coral and Marco Island.

**Email from Amber Crooks**, Natural Resource Specialist, Conservancy of Southwest Florida, Naples, Florida, dated October 29, 2010. Ms. Crooks provided an excerpt from the City of Cape Coral Comprehensive Plan Evaluation and Appraisal Report 2001. Ms. Crooks stated “according to the report, Cape Coral is only ~42% built out, leaving an estimated 25,686 acres for build out, affecting available burrowing owl habitat for the largest owl population in Florida. The map on page 12 of the report starkly shows the amount of unimproved (no homes) residential lots vulnerable to future development.”

**Email from Mark Mueller** dated October 8, 2010. Mr. Mueller offered the following publications for the burrowing owl status review.

- Bowen, P.J. 2000. Demographic, distribution, and metapopulation analyses of the Burrowing Owl (*Athene cunicularia*) in Florida. M.S. thesis, Univ. of Central Florida, Orlando, FL U.S.A.
- Bowen, P.J. 2001. Demography and distribution of the burrowing owl in Florida. Florida Field Naturalist 29(4):113-142.
- Mueller, M.S., M.M Grigione, and R.J. Sarno. In review. Non-urban habitat use of Florida burrowing owls: identifying areas of conservation importance. Journal of Raptor Research.
- Mueller, M.S. 2006. Distribution and habitat characterization of the Florida Burrowing Owl in non-urban areas. M.S. Thesis, University of South Florida, Tampa.
- Mueller, M.S., M.M Grigione, and R.J. Sarno. 2005. Florida burrowing owls and cattle could benefit each other. Florida Cattleman Livestock Journal 69(5): 70-71.
- Mueller, M.S., M.M Grigione, and R.J. Sarno. 2007. Distribution of the Florida burrowing owl: The potential importance of nonurban areas. Journal of Raptor Research. 41:222-226.
- Email from Mark Fredlake** an employee of Avon Park Air Force Range, dated November 1, 2010. Mr. Fredlake provided a spreadsheet and map of burrowing owl locations on Avon Park Air Force Range observed summer 2009.
- Email from Bob Mrykalo**, Tampa, Florida, dated November 1, 2010. Mr. Mrykalo offered the following publications for the burrowing owl status review.
- Mrykalo, R., M. M. Grigione, and R. J. Sarno. 2007. Home range and dispersal of juvenile Florida burrowing owls. The Wilson Journal of Ornithology 119:275-279.
- Mrykalo, R., M. M. Grigione, and R. J. Sarno. 2009. A comparison of available prey and diet of Florida burrowing owls in urban and rural environments: a first study. The Condor 111(3):556–559.
- Mrykalo, R.J., K.A. Caruso, and E.A. Hughes. In press. State listed species permits. Florida Scientist.
- Email from Jesus A. Camps** dated September 8, 2010. Mr. Camps provided an observation of a burrowing owl in the North Shore Crest neighborhood of NE Miami Dade County.

**Email from Dennis Teague** Endangered Species Biologist, Eglin Air Force Base, dated November 2, 2010 with a follow up narrative provided November 6, 2010. Mr. Teague described the surveys and number of burrowing owl burrows found on the air force base and included shape files for mapping purposes.