

# Fire effects on Yuma Clapper Rails and California Black Rails on the Lower Colorado River



Courtney J. Conway  
Christopher P. Nadeau  
Linden Piest

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by

Courtney J. Conway  
Christopher P. Nadeau  
and  
Linden Piest

USGS, Arizona Coop. Fish & Wildlife Research Unit  
104 Biological Sciences East  
University of Arizona  
Tucson, AZ 85721  
ph: 520-626-8535  
FAX: 520-621-8801  
email: [cconway@ag.arizona.edu](mailto:cconway@ag.arizona.edu)

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## Executive Summary

The Yuma clapper rail (*Rallus longirostris yumanensis*) is a federally endangered species and 90% of the U.S. population exists in only 2 wetlands associated with the Lower Colorado River. The California black rail (*Laterallus jamaicensis coturniculus*) is another sensitive species of national management concern that occurs in this region. Historically, marsh habitats along the lower Colorado River were highly ephemeral with periodic flooding and natural fires which eliminated decadent stands of emergent vegetation. Years of flood control and fire suppression has resulted in substantial areas of decadent emergent marsh habitat. To ensure long-term persistence of the Yuma clapper rail and California black rail, we examined the effectiveness of prescribed fire as a possible management tool to restore habitat for these 2 species. Numbers of Yuma clapper rails and California black rails increased significantly following fire in burned sites compared to control sites. Increases were apparent in the first year following fire for clapper rails and in year 2 post-fire for black rails. As a result of the field protocols developed for this project, we initiated a national program for monitoring marsh birds and for evaluating the effects of management actions on marsh birds. The protocols developed by this project are being used by over 100 field offices representing 40 state and federal land management agencies. Products from this study are available on the project webpage: [www.ag.arizona.edu/snr/research/coop/azfwru/fire\\_effects\\_on\\_rails](http://www.ag.arizona.edu/snr/research/coop/azfwru/fire_effects_on_rails).

## Introduction

The Yuma clapper rail (*Rallus longirostris yumanensis*) is a federally endangered species that occurs along the lower Colorado River, in the Imperial Valley of California, in the Colorado River Delta, and along the west coast of Mexico. Ninety percent of the U.S. population exists in only 2 wetlands (Conway et al. 1993) and much existing wetland habitat remains unoccupied. To ensure long-term persistence of U.S. populations, we need to have effective management and mitigation activities that improve habitat quality and benefit Yuma clapper rail populations. One possible management activity that has been proposed to benefit Yuma clapper rail populations is prescribed burning in areas with decadent emergent vegetation (Conway et al. 1993).

Historically, marsh habitats along the lower Colorado River were highly ephemeral with periodic flooding and natural fires eliminating decadent stands of emergent vegetation. These stochastic events resulted in areas of early successional emergent marsh habitat thought to be beneficial to rails (Conway 1990, Conway et al. 1993). Years of flood control and fire suppression has resulted in substantial areas of decadent emergent marsh habitat and very little early successional emergent marsh along the lower Colorado River. Prescribed fire may be the best technique for creating early-successional emergent marsh habitat required to enhance populations of Yuma clapper rails. Indeed, prescribed fire has been repeatedly suggested as a promising conservation measure for restoring Yuma clapper rail populations (Conway et al. 1993, Conway 1995, Eddleman and Conway 1998, Conway and Eddleman 2000), but has yet to be evaluated.

The California black rail (*Laterallus jamaicensis coturniculus*) is another sensitive species of national management concern that may simultaneously benefit from prescribed burning. California black rails are listed as state endangered in Arizona (Arizona Game and Fish

Department 1988), state threatened in California (California Department of Fish and Game 1989), and federally endangered in Mexico. Black Rails are also considered a species of national conservation concern in the U.S. (U.S. Fish and Wildlife Service 2002), are on the National Audubon Society's "WatchList", and were once a Category 1 "candidate" species for federal listing under the Endangered Species Act (U. S. Dept. of Interior 1989). The lower Colorado River is one of three areas remaining with a moderate breeding population of California black rails (Evens et al. 1991, Conway et al. 2001). Hence, active on-the-ground habitat restoration efforts to specifically benefit California black rails on the lower Colorado River should begin now in an effort to recover populations and prevent federal ESA listing.

The effects of fire on California black rails are not known, and opinions are equivocal. Repking (1975) suggested fire be investigated as a possible management tool for California black rails, but Todd (1980) cautioned that regrowth of common threesquare (*Schoenoplectus pungens*), a wetland plant commonly associated with black rails, may not occur fast enough and may be eliminated completely by fire. Areas with three-square bulrush may burn hotter and regrowth may occur at a slower pace compared to cattail in the wetter portions of a marsh (Todd 1980). This project will help determine whether or not fire is beneficial to California black rails.

We conducted pre- and post-burn surveys in both burned and control marshes to examine the effects of fire on the abundance of rails and the quality of rail habitat. This project addresses the goals of the Lower Colorado River Multi-species Conservation Plan (LCR MSCP). Both the Yuma clapper rail and California black rail are considered priority species of concern in the LCR MSCP and goals for both species include the enhancement of existing habitat, restoration of unsuitable habitat, and the establishment of additional breeding locations on the LCR.

### **Field Locations**

Study Sites were located along the lower Colorado River in Arizona (Yuma County) and California (Imperial County), and south of the Salton Sea in the Imperial Valley of California (Imperial County). We worked closely with Imperial National Wildlife Refuge, Havasu National Wildlife Refuge, and Sony Bono Salton Sea National Wildlife Refuge to conduct burns and marsh bird surveys at each refuge. We also surveyed marshes on other state and federally owned lands. See Tables 1-2 for a summary of each study site.

### **Methods**

We conducted call-broadcast surveys for both species of rails in 4 types of study sites: sites recently burned by wildfire ( $n=7$ ), non-burned (control) sites near each wildfire ( $n=14$ ), sites recently burned by prescribed fire ( $n=19$ ), and non-burned (control) sites near each prescribed burn ( $n=24$ ) (Tables 1-2). At each study site, we conducted at least 3 replicate surveys from March-July in years pre- and post-fire. Hence, we had both temporal (pre-burn vs. post-burn) and spatial (burned and unburned) controls built into the study design, providing a rigorous evaluation of the usefulness of fire for marsh management and restoration of Yuma clapper rails and California black rails.

We worked closely with Bureau of Land Management and U.S. Fish and Wildlife Service fire crews to have burns conducted for this study. We developed survey protocols based on our previous studies of marsh bird survey methods (Conway et al. 1993, Conway and Gibbs 2001,

Conway et al. 2001) and on recommendations from a recent wetland bird monitoring workshop at the USGS Patuxent Wildlife Research Center (Ribic et al. 1999). Surveys were conducted during mornings between one half-hour before sunrise until 10:00 am and in the evenings between 5:00 pm until dusk (one half-hour after sunset). All surveys were conducted on days without rain and when wind speeds did not exceed 5 mph. Based on previous marsh bird survey work in the region, conditions during most (99%) mornings are favorable for surveys (i.e., without too much wind) whereas 42% of evenings are too windy for surveys. All surveyors attended 2 weeks of extensive field training, and each surveyor took a hearing test (audiogram) to check their ability to hear subtle bird vocalizations. We used repeated measures analysis of variance to examine whether fire increased abundance of rails.

## **Results**

Numbers of Yuma clapper rails increased following fire and abundance was higher compared to control sites in the 2 years post-burn (Fig. 1). Numbers of California black rails increased following fire and abundance was higher compared to control sites in years 2 and 3 post-burn (Fig. 2). During the course of developing the field protocols for this project, we saw a need to make our field protocols available to land management agencies across the country. Hence, we developed a stand-alone set of field protocols for use by others so that data could be pooled across the country to examine the effects of fire (and other management actions) on secretive marsh birds. This subsequently led to the development a national program for monitoring marsh birds. The protocols developed by this project are being used by over 100 field offices representing 40 state and federal land management agencies. Several of these field offices are using our field protocols to examine fire effects. Products produced from this study are listed in Appendix 1 and 2, and many of these are available on the project's webpage ([www.ag.arizona.edu/snr/research/coop/azfwru/fire\\_effects\\_on\\_rails](http://www.ag.arizona.edu/snr/research/coop/azfwru/fire_effects_on_rails)).

## **Acknowledgments**

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Larned, and Jake Mohlman. We obtained USFWS permits to conduct call-broadcast surveys for Yuma Clapper Rails (permit # TE039466-0). We also obtained the necessary permits from the Institutional Animal Care and Use Committee at the University of Arizona.

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Table 1. Location of prescribed burns (and control areas) used as study sites for examining the effects of fire on marsh birds along the Lower Colorado River.

study site	State	County	UTM (NAD83)	date burned	size of burn (ha)	land ownership	paired control sites
N. Mittry Lake (pts 39-54)	AZ	Yuma	11 S 738750 3637905	21 Feb 2003	20	BLM & AGFD	South Dredge Ramp (pts 1-29)
Imperial NWR housing marsh (pts 1-7)	AZ	Yuma	11 S 734940 3654203	20 Feb 2003	4	USFWS	Painted Desert Trail (points 1-6) Martinez Lake (points 1-29) <sup>1</sup>
Imperial NWR (field 11&10, pts 1-6)	AZ	Yuma	11 S 734552 3652472	20 Feb 2003	7	USFWS	Imperial NWR (field 16, pts 1-8)
Imperial NWR (field 12, pts 1-4)	AZ	Yuma	11 S 734262 3652341	7 Mar 2004	9	USFWS	Imperial NWR (field 21, pts 1-8)
Imperial NWR (field 13, pts 1-8)	AZ	Yuma	11 S 734530 3652026	27 Feb 2005	4	USFWS	Imperial NWR (field 17, pts 1-9)
Imperial NWR (field 14, pts 1-11)	AZ	Yuma	11 S 734664 3652025	28 Feb 2006	8	USFWS	Imperial NWR (field 28, pts 1-4) <sup>2</sup> Imperial NWR (field 10, pts 1-2)
Island Lake - INWR (pts 1-19)	AZ	La Paz	11 S 725741 3657740	4 Feb 2004	242	USFWS	Taylor Lake (pts 1-18) Clear Lake (pts 10-12)
Imperial Dam Rd Marsh B (pts 1-8)	CA	Imperial	11 S 734713 3638457	27 Feb 2005	2	USBR & BLM	Imperial Dam Rd Marsh A (pts 1-7)
Imperial Dam Rd Marsh C (pts 1-9)	CA	Imperial	11 S 734715 3638315	27 Feb 2005	4	USBR & BLM	Senator Wash shore (pts 30-37)
Willow Lake - Havasu NWR (pts B1-14)	AZ	Mohave	11 S 727778 3851716	9 Nov 2001	113	USFWS	Willow Lake (points C1-15)

Table 1. Continued.



Upper Goose Lake - Havasu NWR (pts B1-9)	AZ	Mohave	11 S 728125 3854403	22 Feb 2003	62	USFWS	Upper Goose Lake (pts C1-11)
No Name Lake - Havasu NWR (pts B1-19)	AZ	Mohave	11 S 725484 3851295	7 Feb 2004	46	USFWS	Beal Lake (pts C1-13)
Whiskey Slough - Havasu NWR (pts B1-6)	AZ	Mohave	11 S 727169 3854265	28 Feb 2006	37	USFWS	Whiskey Slough (pts C1-7)
Reidman 3 - SSNWR (pts 1-6)	CA	Imperial	11 S 620048 3660908	13 Feb 2002	8 (20)	USFWS	Reidman 4 (pts 1-3)
Hazard 6 - SSNWR (pts 1-8)	CA	Imperial	11 S 631343 3672562	Mar/Apr 2002	11	USFWS	Hazard 7 (pts 1-6)
B-1 pond (pts 1-11)	CA	Imperial	11 S 620551 3661218	2007	15	USFWS	A-1 pond (pts 1-9)
Hazard 10 - SSNWR (pts 1-6)	CA	Imperial	11 S 632263 3674070	30 Jan 2006	16	USFWS	Hazard 10A (pts 1-3)
Union Pond - SSNWR (pts 1-6)	CA	Imperial	11 S 628342 3671668	Jan/Feb 2001	4	USFWS	Headquarters B pond (pts 1-4)
Hazard 11 - SSNWR (pts 1-3)	CA	Imperial	11 S 632643 3674137	2007	4	USFWS	Bruchard Bay (pts 1-6)
South Teal Alley	AZ	Yuma	11 S 738951 3637440	25 Feb 2005		BLM & AGFD	North Teal Alley
Mittry Lake Islands	AZ	Yuma	11 S 738951 3637440	25 Feb 2005		BLM & AGFD	

<sup>1</sup>also control for Ferguson Lake<sup>2</sup>Also burned on 28 Feb 2006

Table 2. Location of incidental fires (and control areas) used as additional study sites for examining the effects of fire on marsh birds along the Lower Colorado River.

study site	State	County	UTM (NAD83)	date burned	size of burn (ha)	land ownership	paired control sites
North Mittry Lake (pts 1-54) <sup>1</sup>	AZ	Yuma	11 S 738750 3637905	12 Mar 2003	~324	BLM & AGFD	Hidden Shores (pts 1- 66) South of Dredge Ramp (pts 1-29)
South Mittry Lake (pts 1-14)	AZ	Yuma	11 S 739279 3636185	2 Apr 2002	26	BLM & AGFD	Arizona Channel (pts 31-49)
Mission Wash (pts 13-19)	CA	Imperial	11 S 730170 3635403	29 Mar 2001	38	Ft. Quechan Tribe	East Pond (pts 1-8)
Mission Wash (points 1-12)	CA	Imperial	11 S 729595 3635236	Jun 2001		Ft. Quechan Tribe	All-American/Senator's Wash (pts 1-14)
West Pond (pts 1- 19)	CA	Imperial	11 S 736216 3640753	29 Jan 2002	10	USBR	West Pond (pts 26-46) Hidden Shores Marsh (pts 1-23)
Draper Lake (pt 1)	CA	Imperial	11 S 716027 3670669	8 Aug 2001	81	USFWS	Cibola1 (pts 1) Cibola2 (pts 1-2)
Ferguson Lake (YCR pts 1-15) (BLRA pts 1-32)	CA	Imperial	11 S 734499 3650658	29 Feb 2000	83	BLM & USFWS	<b>YCR controls:</b> Martinez Lake (pts 1- 29) <b>BLRA controls:</b> Squaw Lake (pts 13-18) S. Squaw Lake (pts 1-5) Deer Island (pts 1-15) AZ Channel (pts 1-30)
Hidden Shores (pts 16-54)	AZ	Yuma	11 S 737319 3641843	27 Feb 2005	135		

<sup>1</sup>includes the smaller prescribed burn area at N. Mittry that was burned 21 Feb 2003.

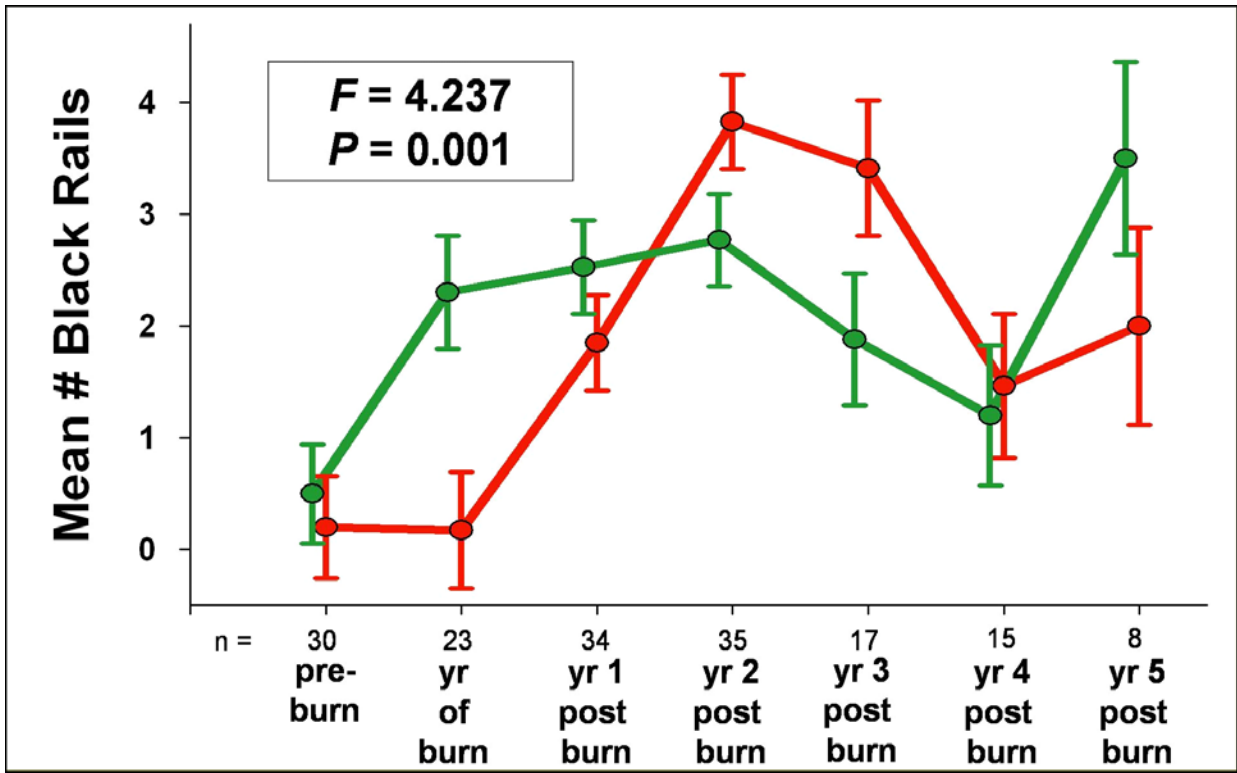


Figure 1. Numbers of Yuma clapper rails increased following fire and abundance was higher compared to control sites in the 2 years post-burn.

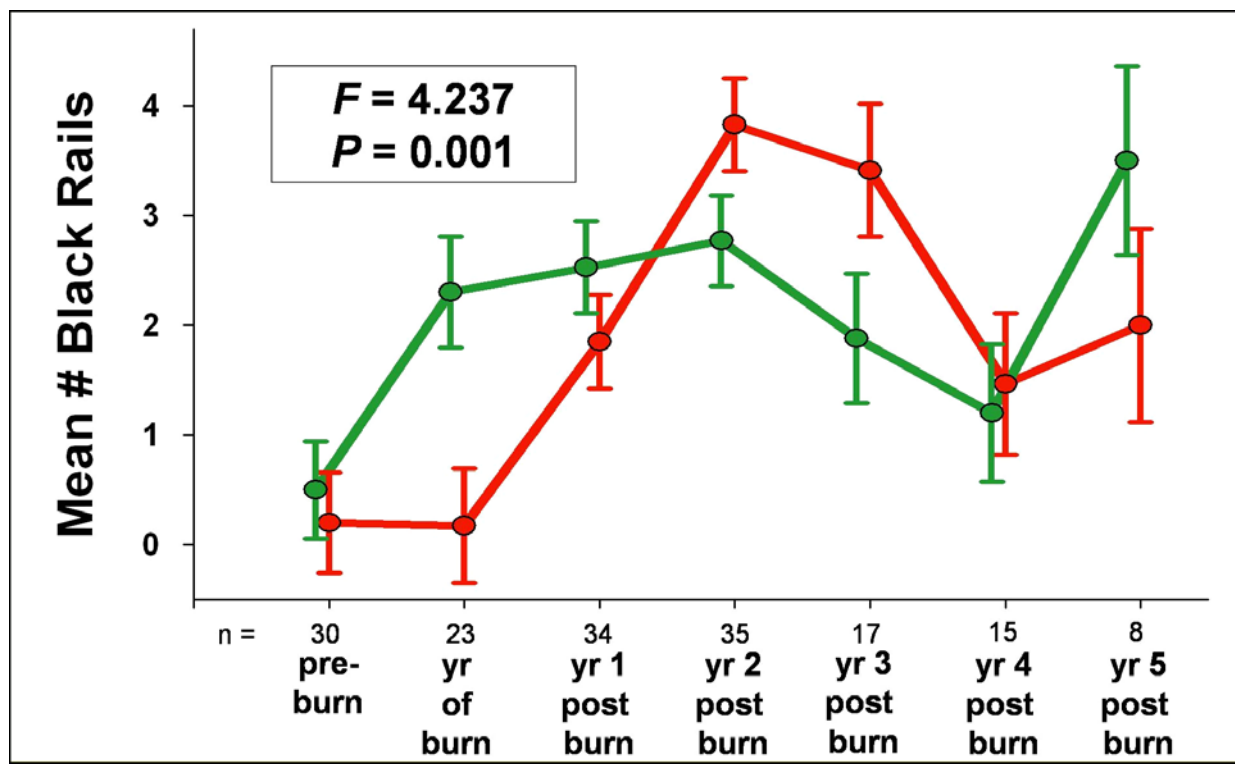


Figure 2. Numbers of California black rails increased following fire and abundance was higher compared to control sites in years 2 and 3 post-burn.

<b>Proposed</b>	<b>Delivered</b>	<b>Status</b>
Annual Progress Reports	2 annual reports ; see citations in Appendix 2	done
Final Technical Report	this document	done
Publications	13 publications; see list in Appendix 2	12 completed, 1 in prep.
Electronic Copies of Data	on file with USDI	done
Field Methods	explained in this document	done
Project Webpage	Research Project #12 under: <a href="http://www.ag.arizona.edu/srnr/research/coop/azfwru/cjc/">http://www.ag.arizona.edu/srnr/research/coop/azfwru/cjc/</a>	done
Website	<a href="http://ag.arizona.edu/srnr/research/coop/azfwru/NationalMarshBird/">http://ag.arizona.edu/srnr/research/coop/azfwru/NationalMarshBird/</a>	done
Workshops	2 in <b>2004</b> , 1 in <b>2005</b> , 1 in <b>2006</b>	done
PowerPoint Presentation	Nadeau, C.P., and C.J. Conway. <b>2005</b> . Fire effects on Yuma clapper rails and California black rails along the lower Colorado River.	done
Conference Presentations	11 presentations; see list in Appendix 2	10 completed, 1 will be given on 8 February 2007
Annual Meetings	met annually with BLM and USFWS fire management personnel	done
Poster	Nadeau, C.P., and C.J. Conway. <b>2005</b> . Fire effects on Yuma clapper rails and California black rails along the lower Colorado River. JFSP Principal Investigator's Conference. San Diego, CA.	done

Appendix 2. Conference presentations and publications based on results from the JFSP project, Fire effects on Yuma Clapper Rails and California Black Rails on the Lower Colorado River.

Presentations:

- Conway, C. J., C. P. Nadeau, and L. A. Piest. 2007. Effectiveness of prescribed fire as a management tool to improve habitat quality of endangered Yuma clapper rails and California black rails along the Lower Colorado River. Arizona-New Mexico Joint meeting of The Wildlife Society and American Fisheries Society. Albuquerque, NM 7 February 2007.
- Conway, C. J., and M. Woodrey. 2006. Implementing standardized monitoring for secretive marsh birds on NOAAs Estuarine Research Reserves. 22<sup>nd</sup> Annual Conference of NOAA's National Estuarine Research Reserve Program. Cleveland, OH. 18 October 2006. INVITED.
- Nadeau, C. P., C. J. Conway, L. Piest, O. Hinojosa-Huerta, and B. Burger. 2006. The effectiveness of multi-species versus single-species call-broadcast surveys for the federally endangered Yuma clapper rail. IV North American Ornithological Conference, Veracruz, Mexico, 6 October 2006.
- Conway, C. J., and M. Woodrey. 2006. A continental program for estimating population trends of marsh birds and monitoring ecological integrity of marshlands in North America. NOAA and Environmental Protection Agency's National Estuary Program Monitoring & Indicators Summer Seminar Series. Washington, D.C. 17 August 2006.
- Conway, C. J. 2006. Recommended continental survey protocols for conducting marsh bird surveys across North America. Marsh Bird Monitoring Technical Workshop, Patuxent National Wildlife Research Center, Laurel, MD. 7 March 2006.
- Nadeau, C. P., and C. J. Conway. 2006. The North American Marsh Bird Monitoring Protocol: a summary of the protocol and its use on the lower Colorado River. Lower Colorado River MSCP Terrestrial Biology Conference, Laughlin, NV, 24 January 2006.
- Nadeau, C. P., and C. J. Conway. 2005. Fire effects on Yuma clapper rails and California black rails along the lower Colorado River. Joint Fire Science Program Principal Investigator's Conference. San Diego, California, 1 November 2005.
- Conway, C. J. 2005. A standardized North American marsh bird monitoring program. National Estuarine Research Reserve Research Coordinator Annual Meeting, Grand Bay, Mississippi, 17 February 2005. INVITED.
- Conway, C. J. 2004. Using prescribed fire to recover the federally endangered Yuma Clapper Rail on the Lower Colorado River National Wildlife Refuges. U.S. Fish and Wildlife Service Region 2 Fire Management Conference. Tucson, AZ. 7 December 2004.
- Conway, C. J. 2004. Evaluating the effects of fire on Yuma Clapper Rails and California Black Rails. 90-min presentation to management staff at Sonny Bono-Salton Sea National Wildlife Refuge. 19 April 2004. INVITED.

Peer-reviewed Publications:

- Conway, C. J., C. P. Nadeau, and L. A. Piest. In prep. Effectiveness of prescribed fire as a management tool to improve habitat quality of endangered Yuma clapper rails and California black rails along the Lower Colorado River. *Conservation Biology*.
- Conway, C. J., and C. Sulzman. Accepted pending revision. Habitat associations and population

- trajectory of California Black Rails in the southwestern U.S. *Wetlands*.
- Conway, C. J., and S. Droege. 2006. A unified strategy for monitoring changes in abundance of birds associated with North American tidal marshes. *Studies in Avian Biology* 32:382-397.
- Conway, C. J., and J. P. Gibbs. 2005. Effectiveness of call-broadcast surveys for monitoring marsh birds. *Auk* 122:26-35.
- Conway, C. J., and S.T.A. Timmermans. 2005. Progress toward developing field protocols for a North American marsh bird monitoring program. Pp. 997-1005 in C.J. Ralph and T.D. Rich, eds. *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, Volume 2*. U.S. Department of Agriculture General Technical Report PSW-GTR-191. Pacific Southwest Research Station, Forest Service, Albany, California.
- Conway, C. J., C. Sulzman, and B. A. Raulston. 2004. Factors affecting detection probability of California Black Rails. *Journal of Wildlife Management* 68:360-370.

Technical Publications:

- Conway, C. J., and C. P. Nadeau. 2006. Fire effects on Yuma Clapper Rails and California Black Rails on the Lower Colorado River. Arizona Cooperative Fish and Wildlife Research Unit, Wildlife Research Report Number 2006-07, Tucson, AZ. (this document).
- Conway, C. J., and C. Nadeau. 2005. Development of a National Marsh Bird Monitoring Program, Progress Report, May 2005. USGS Arizona Cooperative Fish and Wildlife Research Unit Report, Tucson, AZ.
- Conway, C. J. 2005. Standardized North American Marsh Bird Monitoring Protocols. Wildlife Research Report #2005-04, USGS Arizona Cooperative Fish and Wildlife Research Unit, Tucson, Arizona.
- Conway, C. J., and C. Nadeau. 2005. Evaluating the usefulness of prescribed fire to restore habitat for the Yuma clapper rail and California black rail along the lower Colorado River. Pages 31-33 in D.D. Dolton, ed., *Webless Migratory Game Bird Research Program, 2004 Annual Report*. U.S. Fish and Wildlife Service, Denver, CO.
- Conway, C. J., and C. Nadeau. 2005. Effects of fire on Yuma Clapper Rails and California Black Rails. 2004 Annual Report. Wildlife Research Report #2005-01, USGS Arizona Cooperative Fish and Wildlife Research Unit, Tucson, AZ.
- Conway, C. J., and C. Nadeau. 2004. Development of a National Marsh Bird Monitoring Program, Progress Report, September 2004. USGS Arizona Cooperative Fish and Wildlife Research Unit Report, Tucson, AZ.
- Conway, C. J. 2004. Effects of Fire on Yuma Clapper Rails and California Black Rails: 2003 Annual Report. Submitted to U.S. Bureau of Reclamation, Arizona Game and Fish Department, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and the USDA-USDI Joint Fire Science Program. USGS Arizona Cooperative Fish and Wildlife Research Unit, Wildlife Research Report #01-04.