

**A Review of the Third Five Years  
of the  
California Condor Reintroduction Program  
in the Southwest  
(2007-2011)**



**May 2012**

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This report is prepared for the U.S. Fish and Wildlife Service, Pacific Southwest Office (Region 8), Sacramento, California, in fulfillment of the requirements of the Federal rule (61 FR 201:54044-54059; USFWS 1996a) allowing for the reintroduction of California condors under a nonessential experimental designation in northern Arizona and southern Utah.

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### Disclaimer

References to manufacturers, products, and brand and trade names do not imply endorsement by the preparers, the Southwest Condor Working Group, or the United States Government.

## List of Acronyms and Terms Used in this Report

µg/dl	micrograms per deciliter
10(j) area	(Arizona/Utah) nonessential experimental population area
AGFD	Arizona Game and Fish Department
APHIS	Animal and Plant Health Inspection Service
BLM	Bureau of Land Management
CDFG	California Department of Fish and Game
DVM	Doctor of Veterinary Medicine
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
GPS	Global Positioning System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NP	National Park
NPS	National Park Service
PTT	Platform Terminal Transmitter
SCWG	Southwest Condor Working Group
TPF	The Peregrine Fund
TWS	The Wildlife Society
UDWR	Utah Division of Wildlife Resources
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
VHF	Very High Frequency
WMU	Wildlife Management Unit

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# **A Review of the Third Five Years of the California Condor Reintroduction Program in the Southwest (2007-2011)**

## **INTRODUCTION**

At the end of 2011, the Southwest Condor Working Group (SCWG) completed the fifteenth year of the California condor (*Gymnogyps californianus*) recovery program in northern Arizona and southern Utah. This reintroduction is conducted under a special provision of the Endangered Species Act (ESA) that allows for the designation of a “nonessential experimental” population. Under this designation [often referred to as the “10(j) rule” or “10(j) area” for the section of the ESA allowing this provision] the protections for an endangered species are relaxed, providing greater flexibility for management of a reintroduction program. As part of the Federal rule-making process that established the nonessential experimental designation (61 FR 201:54044-54059; 16 October 1996 [USFWS 1996a]), the U.S. Fish and Wildlife Service (FWS) agreed to a formal evaluation of the progress and public acceptance of this reintroduction within the first five years of the program, and every five years thereafter. In addition to the final rule establishing the nonessential experimental designation, FWS entered into a “Memorandum of Understanding” (MOU) with various cooperators, and a 1997 reintroduction implementation agreement with local governments. These documents outline commitments by FWS and cooperators in the implementation of the condor reintroduction program and the application of Federal regulations pertinent to the program. This report evaluates the progress of the condor reintroduction program in the Southwest and compliance with the established commitments for the third five-year period (2007-2011) of the program.

## **Background**

The California condor recovery program in the Southwest includes northern Arizona and southern Utah and has been entered into by the FWS as a partnership among various Federal agencies [primarily: Bureau of Land Management (BLM); National Park Service (NPS); U.S. Forest Service (USFS)] and state agencies [Arizona Game and Fish Department (AGFD) and Utah Division of Wildlife Resources (UDWR)], and The Peregrine Fund (TPF), a private/nonprofit organization. TPF manages the day-to-day operations of the field program including release, monitoring the birds’ movements, working with local landowners and land managers, and providing any additional care for the birds. TPF also maintains a condor breeding facility at the World Center for Birds of Prey in Boise, Idaho. Representatives of these agencies and organizations, together with others identified in the interagency MOU, form the SCWG, facilitating coordination among the agencies and organizations. The MOU was last updated in 2010 (see Coordination among Program Cooperators and Compliance with Commitments section). We have included contact information for participants in the SCWG at the end of this review.

The first condor release in northern Arizona occurred on 12 December 1996. By the end of 2011, a total of 134 condors had been released into the wild in the 10(j) area, and 15 chicks had been wild-hatched in northern Arizona. Sixty-nine of these birds had died, including eight of the wild-hatched chicks. There were a total of 73 free-flying condors in the southwest program by the end

of 2011. Reintroduction efforts have been complicated by lead poisonings, predation, problems from condor-human interactions, and shootings.

The nonessential experimental population status applies to condors in the Southwest only when they are within the geographic bounds of the designated 10(j) area, which is defined by: Interstate Highway 40 on the south, U.S. Highway 191 on the east (parallel to the New Mexico and Colorado state borders), Interstate Highway 70 on the north, and Interstate Highway 15 to U.S. Highway 93 near Las Vegas, Nevada on the west (Figure 1). When condors leave this area they receive full protection of the ESA, which may also have regulatory implications.

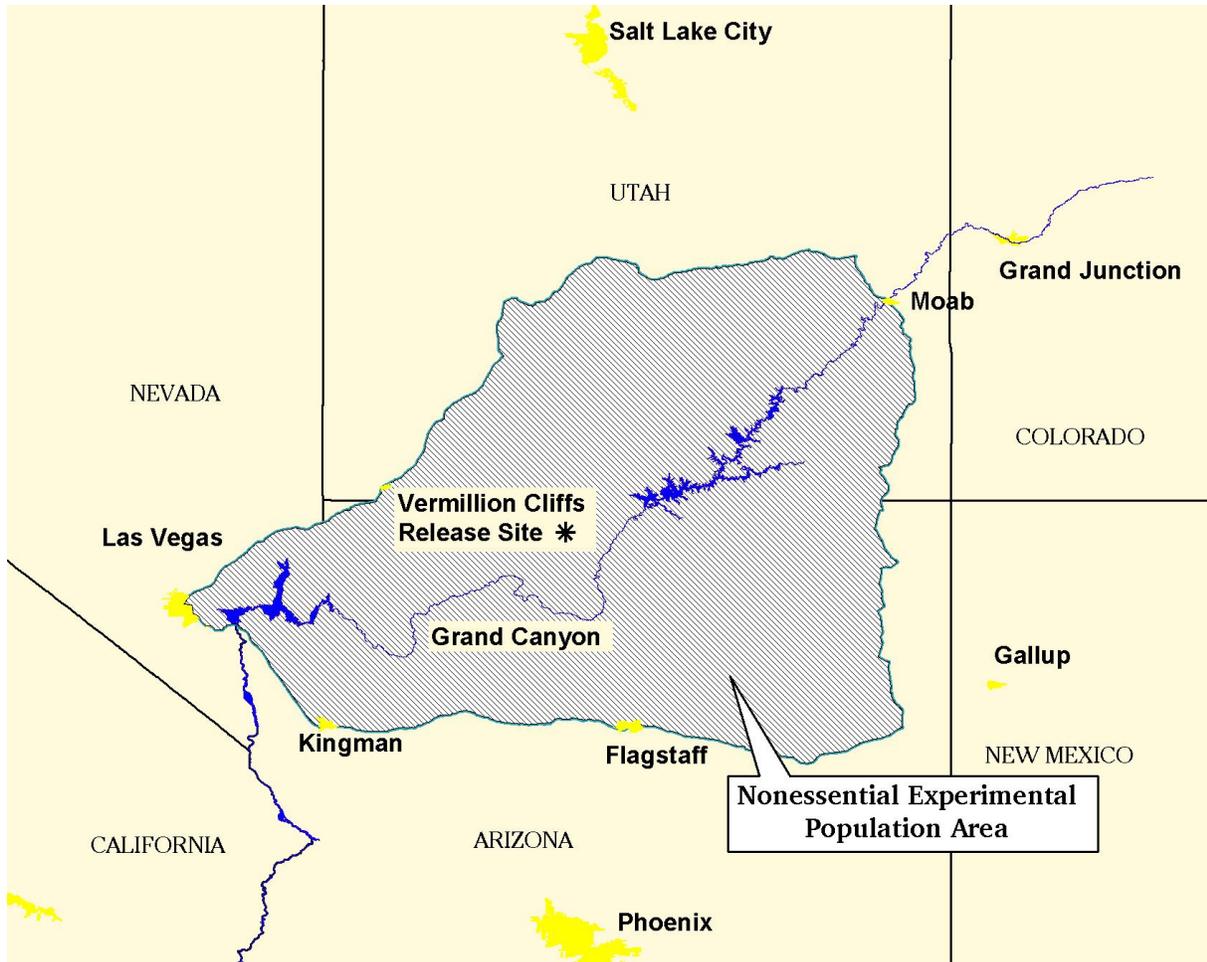


Figure 1. California condor nonessential experimental population [10(j)] area.

Condors have been known to fly widely, but now generally travel between two main areas, the Grand Canyon Ecoregion/Colorado River corridor in Arizona and the Kolob Terrace/Zion National Park (Zion NP) area in Utah. Condor activity in southwestern Utah has increased considerably during the reporting period (2007-11). Groups of condors now regularly reside in Utah from April through November. We anticipate that breeding in the area will occur in coming years.

## Review Process

This review was conducted by the Southwest Condor Review Team (referred to within this report as the review team), a subset of the SCWG that included condor biologists, representatives of local land and wildlife management agencies and FWS, with input from local governments and the public. This report, prepared by the review team, is submitted to the FWS Pacific Southwest Regional Office, which is the lead office for the California condor recovery program. The FWS is responsible for making any final decisions regarding the continuation of this reintroduction program and adoption of recommendations from this review. This document fulfills the five-year review requirement for the third five-year period as stated in the final rule establishing the nonessential experimental population of California condors in northern Arizona and southern Utah.

The guidelines under which the review was conducted come from the final rule establishing the nonessential experimental designation:

Final Rule, Endangered Species Act, Section 10(j), Special Rule 10 (61 FR 201:54048).  
*The status of the reintroduction project is to receive an informal review on an annual basis and a formal evaluation within the first 5 years after the initial release, and every 5 years thereafter. This evaluation will include, but not be limited to: a review of management issues; compliance with agreements; assessment of available carrion; dependence of older condors on supplemental food sources; post release behavior; causes and rates of mortality; alternative release sites; project costs; public acceptance; and accomplishment of recovery tasks prescribed in California Condor Recovery Plan. The number of variables that could affect this reintroduction project makes it difficult to develop criteria for success or failure after 5 years. However, if after 5 years the project is experiencing a 40 percent or greater mortality rate or released condors are not finding food on their own, serious consideration will be given to terminating the project.*

The purpose of the review is to formally evaluate the reintroduction program and identify future management needs. In addition, the review identifies whether condors have a reasonable opportunity for continued survival in the 10(j) area, if the level of protection under the ESA 10(j) rule is sufficient to continue the program, and whether the FWS and other agencies have complied with their commitments to the reintroduction program, as formalized in the MOU.

The Southwest California condor reintroduction program was last reviewed in 2007 for the period 2002 -2006 (Southwest Condor Review Team 2007). The review recommended continuing the reintroduction program, but identified lead contamination as a major factor that could hinder its success. The review stated that in order to succeed in the establishment of a self-sufficient population of condors, the effects of lead contamination must be reduced or eliminated.

This report examines each of the major issues brought forward from public comments or identified by review team members, in the context of the review guidelines from the final rule. In addition, issues addressed in the final rule have been re-assessed. Each topic is individually addressed and grouped in the broad categories of biology and management, lead reduction

efforts, administration, and research and management. The review also provides recommendations to improve the effectiveness of the program over the next five years.

## **Public Participation**

The review team sought to include broad participation in the review process. The team solicited comments and participation in the review from government agencies (including members of a coalition of county and local governments in the California condor experimental population area that were signatory to the 1997 “Implementation Agreement with Local Governments”), Tribes, business owners, environmental and industry groups, local residents, and condor and endangered species experts who have expressed interest or participated in the reintroduction program, as well as from the general public. We provided notification of the review through direct mailing to 299 addresses on September 27, 2011, website posting ([www.fws.gov/southwest/es/arizona/](http://www.fws.gov/southwest/es/arizona/)), and news releases sent to 106 news outlets/journalists (predominantly print and radio in northern Arizona, southern Utah and southeastern Nevada) on November 23, 2011. A number of media outlets in southern Utah and northern Arizona published or posted articles or broadcast information about the review, including the Associated Press and *Deseret News* articles that were republished in California, Utah, and Arizona news outlets. The review announcement requested information on specific topics and identified sources for additional information. Requests for comments were solicited starting on September 27, 2011, and were accepted through December 16, 2011. We received a total of 25 sets of public and agency comments via direct mail, email, and telephone. Written comments are included in the administrative record for this review and are available for inspection by appointment at the Arizona Ecological Service Field Office, 2321 W. Royal Palm Road, Suite 103, Phoenix, Arizona, 85021, phone: (602) 242-0210. Appendix A contains a summary of the comments that we received.

## **BIOLOGY AND MANAGEMENT**

### **Release Strategies**

During the five years of this reporting period (2007-2011), the Southwest condor recovery program has continued to advance. As the wild population matures, observations such as the establishment of successfully reproducing condor pairs, an overall increase in numbers of free-ranging condors, and consistent seasonal range use indicate progress. We have continued to release condors throughout the period, and there were 73 free-ranging individuals at the end of 2011. However, the most significant issue raised in the second program review, exposure to lead contamination, continues to affect both individual birds and the southwest population. Throughout the remainder of this review, each individual condor is represented by a studbook number, sex (M or F if known, ? if unknown), and the hatch-year; for example, 114M95.

California condors were first reintroduced in northern Arizona in December 1996, when six birds were released from BLM-administered lands at the western end of the Vermilion Cliffs. Eight additional releases followed through December 2001, and 15 releases occurred during the second five year period (2002-2006) (Arizona Condor Review Team 2002, Southwest Condor Review Team 2007). Releases within the third five-year-reporting period began on 3 March 2007 when three condors were released at Vermilion Cliffs. An additional 38 condors were released there in

16 subsequent events (Table 1). Reintroductions generally involved ground transportation of fledgling-age or older, captive-produced condors from the World Center for Birds of Prey Captive Breeding Facility to a 40x60x18-foot flight pen with an adjacent 30x15x5-foot semi-enclosed box structure containing sheltered perches. All condors within the flight pen were exposed to a mock power pole fitted with a low voltage electrified cross arm for aversive conditioning to electrical structures. Extensive modifications of the two Vermilion Cliffs release site structures were completed in an effort to adapt to the growing needs of the program. The modified release pen has been retrofitted with a sliding door on the roof of the structure to eliminate potential entry of ground-dwelling predators. This structure has become a key component of releases as well as seasonal trapping for transmitter refitting and health checks, including lead testing.

*Table 1. Summary of initial condor releases in the Southwest (2007-2011).*

<u>Date</u>	<u>Number Of New Condors Releases</u>	<u>Died</u>	<u>Returned To Captivity</u>	<u>Survive In Wild</u>
3 March 2007	3	1	1	1
7 October 2007	2	0	0	2
15 March 2008	6	3	0	3
11 September 2008	1	1	0	0
7 November 2008	2	1	0	1
12 February 2009	3	0	2	1
7 March 2009	2	1	0	1
8 March 2009	2	0	0	2
30 April 2009	2	1	0	1
21 May 2009	3	2	0	1
2 November 2009	2	1	0	1
7 March 2010	2		0	2
25 September 2010	2		0	2
26 November 2010	2		0	2
24 September 2011	3		0	3
14 October 2011	2		0	2
8 November 2011	2		0	2
<b>Totals</b>	<b>41</b>	<b>11</b>	<b>3</b>	<b>27</b>

### **Monitoring and Data Collection**

Prior to release, each condor was fitted with numbered patagial (wing-mounted) tags and a pair of patagially-mounted (sometimes retrix- [tail feather] mounted) radio transmitters produced by Advanced Telemetry Systems, Holohill Systems, Microwave Telemetry, or Merlin Systems. The transmitters were either conventional Very High Frequency (VHF) or Global Positioning System/Platform Terminal Transmitter (GPS/PTT) instruments. With some exceptions, the

provision of two transmitters per bird provided added security in case of failure of one of the units and often supplied both GPS and conventional radio-telemetry data.

TPF attempted to recapture the birds annually to replace faulty or expired transmitters and perform health checks as needed. During the third five years of the reintroduction program, TPF necessarily reduced the size of the field crew from eleven to nine biologists in response to funding instability.

TPF biologists tracked the daily movements and activities of condors throughout the reporting period. Because ground tracking has become more difficult with the increase in the number of free-flying birds and their more frequent and widespread movement throughout the region's rugged terrain, TPF has come to rely partly on satellite-based GPS/PTT transmitters (Microwave Telemetry), a state-of-the-art alternative to ground tracking made possible in part by the AGFD and UDWR. Although these instruments are slightly heavier than conventional transmitters, they do not require modification of the normal attachment configuration. The GPS transmitters are designed to record hourly position fixes with resolution of approximately 50 meters, and to report them to orbital satellite arrays several times per day, providing TPF with nearly real-time information on locations of individuals.

Frequently, TPF acquires, via a telnet connection, the accumulated GPS fixes from previous days and transfers them to topographical maps in a geographic information mapping system. The data are then used by the field manager to plan tracking strategies and to direct any necessary management actions. TPF has mapped entire sequences of movement by GPS-equipped condors, including, for example, pair formation, prospecting for nest caves, and incubation exchanges. The transmitters have been especially valuable in revealing locations of condor concentration and prolonged activity in difficult-to-access canyon regions, including remote areas of southwestern Utah and the western portion of the Kaibab Plateau. TPF uses the transmitters to locate foraging areas, and knowledge of these areas has become particularly important since the summer of 2000 when the first known lead-related fatalities occurred. In all, TPF has maintained contact with over 80% of the population, documenting behavior, roost locations, foraging activities, and identifying group activities within the population. TPF uses these data to identify potential threats and to investigate behavioral anomalies, health needs, and incidents of lead poisoning, which is the leading cause of death of condors released in northern Arizona.

## **Behavior**

Condors, unlike turkey vultures that primarily use olfactory systems while foraging, are attracted to areas of activity through visual cues. Those cues may be in the form of a gathering of other scavengers and/or predators. If a scavenger's behavior (perching near humans or artificial structures) results in a positive food reward, the scavenger is likely to continue the behavior and remain in close proximity to those structures or gatherings. Common ravens are representative of the latter scenario. Evolutionarily, condors have developed relationships with ravens and humans for as long as humans have subsisted by hunting and feeding on the remains of hunted animals. Given the tendencies of humans to feed wildlife today and the fact that condors do not fear humans, it is of the utmost importance that developing populations of condors do not

become comfortable in the presence of humans or artificial structures. Therefore, TPF continues to condition condors by hazing and confinement for the purpose of breaking patterns of undesirable behavior. TPF bases that effort on their experience over the course of the program that such conditioning results in improved behavior as the birds mature. As in the previous two reporting periods, TPF placed condors in confinement for purposes of breaking behavior patterns likely to result in either habituation or death. In most instances condors are held for a short period and then re-released and monitored closely to ensure they cease the undesirable behaviors. Despite these efforts, undesirable behavior could not be corrected in five condors (282F02, 324M04, 327F04, 378F05, and 380M05), and they were transferred to the captive flock. Two of these birds were selected as candidates for an educational display at the World Center for Birds of Prey, while the other three were released in California as part of an experiment. Ultimately, the three were recaptured, deemed unfit for release and sent to other captive facilities. Condor 265M02, originally released at Pinnacles National Monument in 2004, was translocated to the Arizona release site with condors 266M02 and 270M02 in another experiment to try and break patterns of undesirable behavior. Condor 265M02 was the last of the three to be released on 8 October 2007, and all three assimilated into the flock without incident.

### Courtship and Reproduction

Few historical data exist on age of first breeding among California condors in the wild (Koford 1953; Snyder and Snyder 1989). The average age of first reproduction for both males and females is now known to be 9.5 years of age (Mace 2011). All data on wild and captive California condors indicate a clutch size of one egg per annum, and successful pairs will usually forego reproduction in a year following the successful hatching of an egg as long as they are caring for the previous year's chick. If the first egg is laid early enough in the season but fails to hatch, the female can recycle and lay another in the same season (Snyder and Hamber 1985). In optimal conditions where a fledgling is incorporated into an existing flock, available forage is sufficient, and there is limited disturbance of the nesting pair, it is possible for a pair to produce young in successive years, as condors 114M95 and 126F95 did in 2009 and 2010 (Table 2).

*Table 2. Wild-hatched young produced 2003-2011. (Note-underlined studbook numbers represent those chicks surviving at the end of the reporting period).*

Producing Pairs		2003	2004	2005	2006	2007	2008	2009	2010	2011
Male/ Hatch Yr.	Female/ Hatch Yr.									
123M95	127F95	305M		<u>392M</u>			472F			
114M95	149F96		<u>342M</u>							
122M95	119F95		<u>350M</u>					527?		
114M95	126F95			<u>389F</u>		459M		515?	558?	
134M96	210F99					<u>441M</u>				<u>634?</u>
187M98	133F96						476M			633?
193M98 or 243 M01	241F01									<u>610?</u>

The following discussion summarizes breeding activity for each year of the reporting period for those birds within or beyond their ninth year.

2007 – Four pairings were anticipated because there were only four females of nine years of age and older in the population. However, two younger females (210F99 and 195F99) were involved in reproduction, resulting in a total of six pairs of condors exhibiting nesting behavior. Three of these pairings showed promise of successful nesting, but only two produced young. One chick, 459M07, was produced at the Vermilion Cliffs by parents 114M95 and 126F95, and the other, 441M07, was hatched deep within the Grand Canyon by parents 134M96 and 210F99.

Condors 133F96 and 158M97 looked as if they would produce a chick until an additional female, Condor 195F99, took up residence in a nest cave below them. We observed male Condor 158M97 divide his time between both nest caves, suggesting the extra female may have laid an egg. Shortly thereafter, however, both of these nests were abandoned. We climbed into both caves to investigate but found nothing. By the end of the breeding season Condor 195F99 began showing interest in male Condor 187M98. The east Kaibab pair (158M97 and 136F96) began the breeding season with paired flights, nest cave investigations at Kane Canyon, and copulations, but subsequently separated, showing no signs of what would have been their third attempt at nesting. Condor 136F96 died soon thereafter, likely from fragments of coins found in her digestive tract. A previously successful South Rim pair (123M95 and 127F95) appeared as though it would again nest in the Grand Canyon but abandoned the area altogether during the incubation stage. A new pair (223M00 and 253F01) in the Marble Canyon section of the Colorado River looked as though it was investigating caves. This pair exhibited multiple copulations and paired flights. We investigated the cave they visited most often, but found neither an egg nor eggshell fragments.

2008 – Six pairs of condors exhibited nesting behavior during 2008; three of the pairings showed promising breeding activity, but only two produced young. The proven pair 123M95 and 127F95 produced a chick in Salt Creek in the Grand Canyon using the same nest they used to produce the first wild-hatched chick in the history of the Arizona project in 2003. The second pair 187M98 and 133F96 produced a chick on their first attempt together in a cave below Grandeur Point, also in the Grand Canyon. A highlight for this pair is they were a first-time pairing resulting from a male who lost its mate in 2007 and a female from an unsuccessful trio in 2006.

The Vermilion Cliffs pair 114M95 and 126F95 looked as though they were going to produce yet another chick in the 2008 season even though they had produced a chick the previous year. After an initial broken egg, 126F95 recycled, laid another egg, and the pair incubated in normal fashion, but the egg failed to hatch. Another pairing, 158M97 and 195F99, both birds from the previous year's trio, nested immediately below the Vermilion Cliffs release site, but failed to produce a chick. Condors 162M97 and 281F02 showed promising signs of nest searching and possibly an egg, but the effort was thwarted when the female died of zinc toxicosis from ingested coins. One last pair, 223M00 and 253F01, failed to produce an egg in what appeared to be its second attempt at selecting a nest and possibly producing an egg.

2009 – We again expected five pairs based on the five females of nine years of age and older, but with the addition of 253F01 and 223M00's nesting attempts, six pairs exhibited breeding behavior. In addition, two pairs tended chicks from the previous year.

Proven breeding pair 114M95 and 126F95 produced its third chick together. Prior to this pairing, Condor 114M95 produced chick 342M04 with Condor 149F96 in 2004. This season's chick, 515?09, was the fourth that he had sired, the most of any bird at that time. We obtained the first visual of chick 515?09 on 26 May 2009.

Condor 210F99, who had recently lost her mate, continued to show interest in the Tapeats Canyon area deep within the Grand Canyon. Condor 122M95, who lost his mate 119F95 in 2006 to lead poisoning, also shared some interest in the area. Both adults had produced chicks with previous mates. Early signs suggested that they would pair, and this was further implied when GPS data from 210F99 made clear that she was spending several days tucked away in the canyon while condor 122M95 would return to the release site alone. This was followed by the arrival of 210F99 at the release site, and the disappearance for several days of her new mate, presumably tending an egg. Finally, after several attempts at locating the nest cave, project biologists obtained the first visual of the new chick, 527?09, in July 2009.

Condors 158M97 and 195F99 made their second attempt at nesting immediately below the Vermilion Cliffs Release Site. The close proximity to such a high activity area likely led to the failure of this nest, which was abandoned in May.

Condors 223M00 and 253F01 made their second attempt within the walls of the Marble Canyon section of the Grand Canyon just downstream from Navajo Bridge, but a few days into incubation, TPF found a broken egg in the shallow nest ledge. Condor 253F01 recycled and laid a second egg several miles downstream in a much better location, but it was apparent they had failed when both parents abandoned the nest in May.

Condors 234M00 and 280F02 made what could have been their second attempt at nesting within the Grand Canyon. Due to the remote location within the canyon, our assumptions were based solely on movements in and out of the area of the suspected nest. Based on their attendance at the presumed nest site and the release site, we believe they could have laid an egg in March and later abandoned the area in May.

Early in the 2009 breeding season, condors 162M97 and 316F03 appeared to show considerable interest in one another, even investigating nearby cliff faces for nest sites. However, there was no indication they actually produced an egg.

2010 – Six of the expected pairs exhibited breeding behavior. In addition, the two females younger than nine years of age maintained pair bonds with their mates.

Proven breeding pair 114M95 and 126F95 produced another chick, Condor 558?10, making this season's chick the fifth that 114M95 had sired. Condor 126F95 laid this egg on 14 February, the earliest laying date since breeding was first documented. We obtained the first visual confirmation of this chick on 24 May 2010.

Condors 158M97 and 195F99 made their third attempt at nesting, this time in a secluded cave on the west flank of the Kaibab Plateau. From observing their behavior, we estimated that 195F99 laid her egg on about 12 March 2010. The pair tended the egg until 3 May 2010, but abandoned the cave thereafter, an obvious indication of failure. We found only eggshell fragments in the nest cave.

The previous year's trio of Condors 193M98, 243M01, and 241F01 appeared to incubate an egg. Based on behavior, we estimated a laying date of 2 April 2010, but by 21 May 2010, 7 days prior to the expected hatch date, the trio abandoned the nest. The problems inherent with trios likely contributed to the failure.

After the disappearance of their previous year's chick 527?09, we expected Condor 210F99 and Condor 122M95 to nest again within the walls of the Grand Canyon in the vicinity of Tapeats Wash. Based solely on behavior, we suspected an egg by 26 March. However, the pair abandoned the area by 15 September. Even so, the female revisited the nest area multiple times, leaving some question as to what actually happened.

Condors 223M00 and 253F01 appeared to have produced an egg on 1 April 2010, but the pair abandoned the nest 23 days later for unknown reasons. This was the third year they attempted to produce young (condors are usually successful on their third attempt). Condor 223M00 was found dead in early May. A necropsy identified lead poisoning as the cause of death, and likely explains the early abandonment of the pair's nesting attempt.

Condors 162M97 and 296F03 made their first attempt at nesting when 296F03 began tending a nest site on the south end of the Paria Plateau on 10 March. This pair abandoned its nest 63 days later.

We suspected a third pairing (Condors 287M02 and 314F03), but the activity occurred so deep in the Grand Canyon that we were unable to make direct observations and were obliged to rely solely on GPS data and scant conventional telemetry data. We do not know whether the pair, which appeared to concentrate in the area known as the Great Thumb, produced an egg. No untagged condors have yet been observed in the population, so this pair either did not breed or failed in their attempt.

*2011* – All six pairs that were expected to breed and three chicks were produced.

Proven breeding pair 114M95 and 126F95 appeared to produce another egg between 24 and 26 March, but their previous year's chick, Condor 558?10, was observed entering the nest cave, possibly disrupting the pair, and they abandoned the cave soon after. This behavior is not entirely unexpected since condors generally produce only one young every two years.

Surprisingly, last year's trio of Condors 193M98, 243M01, and 241F01 appeared to incubate an egg just as they had done the previous year. This time, however, they nested in a new location. We observed consistent incubation behavior by all three and, finally, a chick. This is the second account of a trio involved in courtship and breeding behavior throughout the history of the entire

recovery effort, but the first record of a viable chick. Condor 610?11 fledged on 27 October and was later observed returning to the nest cave after successive flights.

Condors 187M98 and 133F96 were successful in producing a chick, 633?11, within the Redwall formation of the South Rim of the Grand Canyon, just as they had done in 2008. TPF field biologists visually confirmed the chick on 30 August. This is the second chick from this pair in four years. An abrupt change in the parents' behavior combined with a lack of continued visual confirmation of the chick in early October prompted some concern and an investigation ensued. After two unsuccessful trips into the Grand Canyon, NPS biologists discovered and collected the carcass of Condor 633?11 on 23 October. Preliminary necropsy results could not confirm cause of death. The chick had good fat reserves, but the radius and ulna of the left wing were fractured. It was not clear whether this damage occurred prior to or after its death. Small bits of micro-trash, including bottle caps and a piece of rope and metal, were found in the bird's ventriculus, but it is unlikely they were the cause of death.

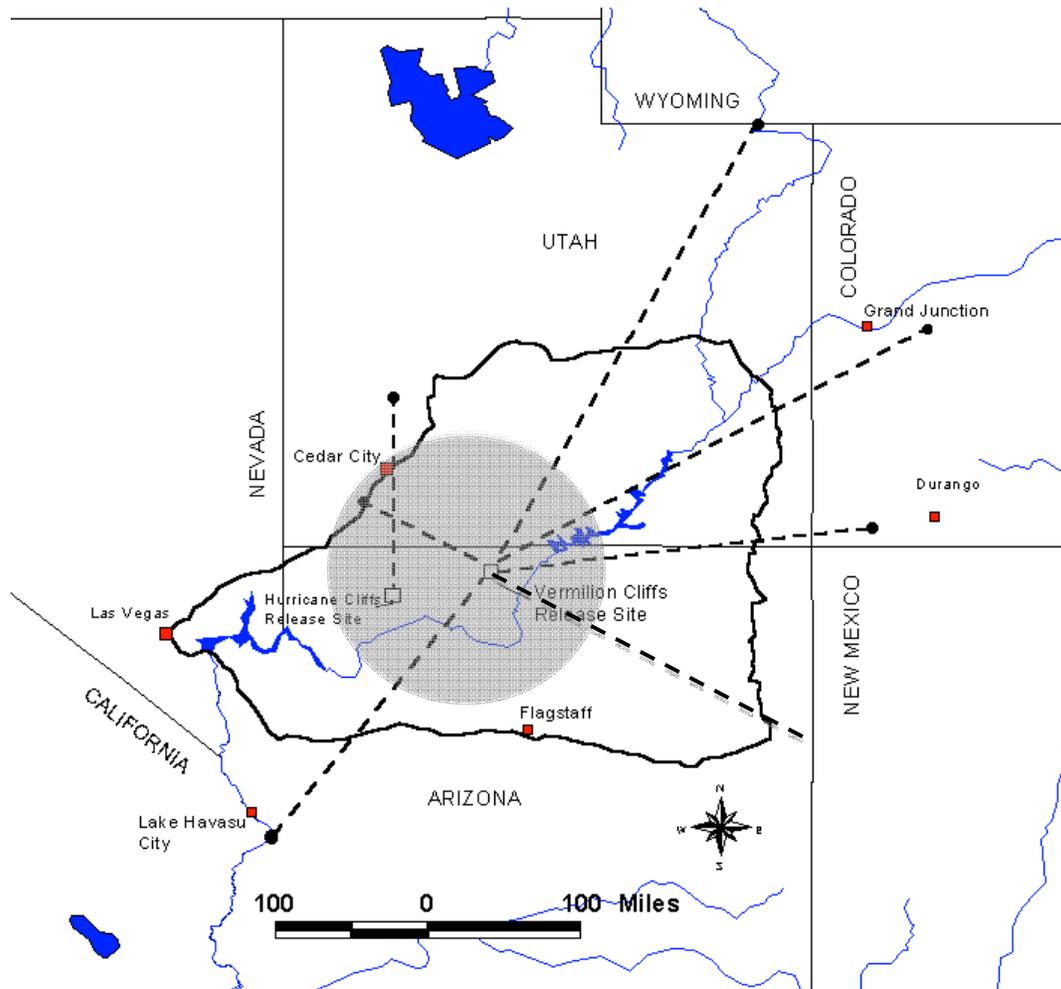
The pair of Condors 234M00 and 280FF02 were thought to have produced eggs in previous years, but failed to produce young until this season. They produced Condor 634?11 in a new location near the Battleship formation at the South Rim of the Grand Canyon. Due to the remote location of the nest cave, this chick was not confirmed until August 30.

Condors 266M02 and 296F03 laid an egg but abandoned the effort in the early stages of incubation.

## **Movements**

TPF's crew of nine to eleven biologists monitored the reintroduced and wild-hatched population of California condors primarily by road tracking aided by VHF and GPS telemetry in addition to visual observations when possible. Aerial telemetry flights were used sporadically to search for missing birds. Tracking data for this five-year review continually revealed annual cycles of movement consistent with the previous review period. While remaining near the release site immediately after release, new releases took to the well-established condor primary range throughout its 112 km-radius, benefiting greatly from the presence of a seasoned condor flock. Heavy use of the Vermilion Cliffs release site by the majority of condors during the winter months followed by increasing use of the Colorado River corridor and South Rim of the Grand Canyon in early spring continued to be the norm.

Condors of the southwest population are known for long distance travel with the longest trips recording wide arching loops into eastern Nevada, southwestern Arizona, east along the Mogollon Rim to the New Mexico border, and north as far as Flaming Gorge Wyoming. However, the established flock, with multiple breeding pairs seasonally holding territories, seems to have held the new releases more tightly to the 112 km-radius of their primary range (Figure 2).



*Figure 2. Documented movements outside of the primary range of the experimental population of California condors.*

Although a condor may move between roost zones within the course of a day, comparing the logged roost locations from one year to the next has been most revealing. As condors became more and more self-sufficient, their patterns of seasonal movement have been more predictable. For example, as soon as domestic sheep are moved into the high country of southern Utah in May or June, the condor population shifts its focus to take advantage of the tremendous source of carrion followed by the lure of remains of hunted carcasses on both the Kaibab Plateau and southern Utah during the months of November and December (Figure 3).

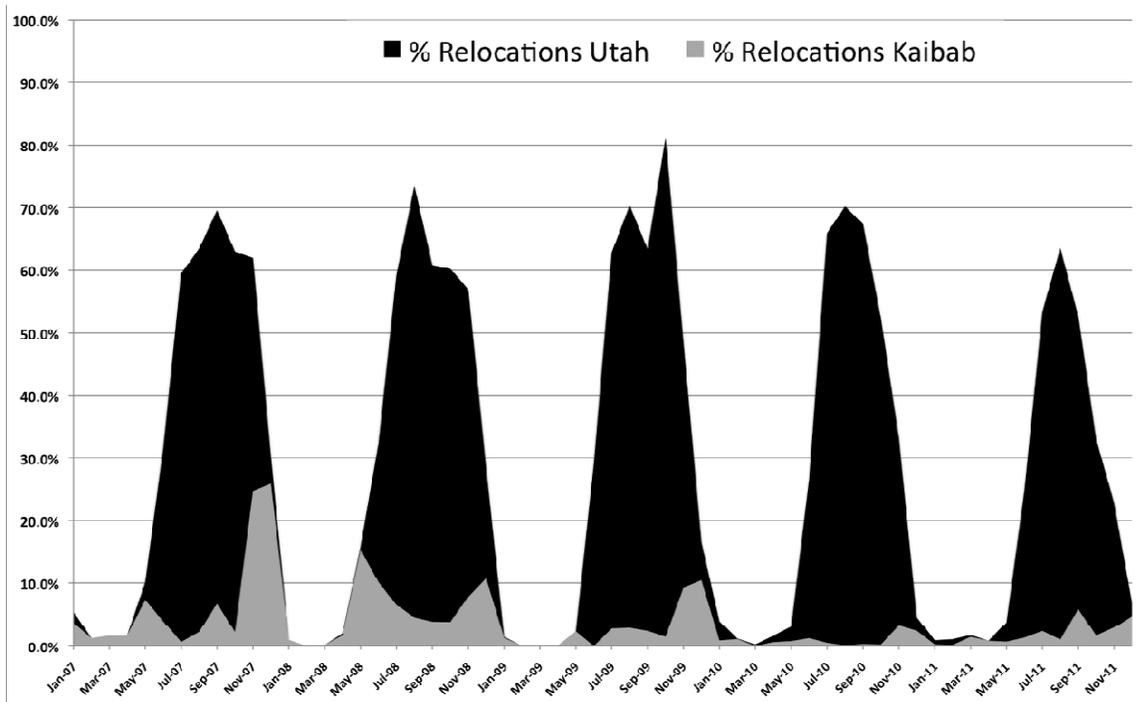


Figure 3. Comparison between two areas of range use (Utah vs. Kaibab) represented by monthly roosting relocations of free-ranging California condors.

## Health

Lead poisoning continues to be the number one diagnosed cause of mortality in the southwest condor population. Like the previous five years of the condor release program in Arizona, lead poisoning cases occur predominantly in the fall and winter months and are associated with the big-game hunting seasons. However, episodic exposure events revealed by opportunistic trapping and testing sessions throughout the course of a given year continue to indicate that the pathway for lead exposure in scavengers is ever present. Any animal dispatched with lead ammunition whose remains are left in the field yields an opportunity for any scavenging animal to become exposed to lead.

The frequency and magnitude of lead exposure (lead exposure history) in condors cannot be known solely from planned or opportunistic/planned trapping, testing, and observed lead-caused deaths. After consumption, acids in the gut thus convert lead fragments to soluble salts that are absorbed into the blood stream and delivered to soft tissues, organs, bones and the brain (Pokras and Kneeland 2009). The half-life for lead in blood is reported to be roughly two weeks (Green *et al.* 2009; Fry and Maurer 2003). Blood-lead scores are but a snapshot in time relative to the continuum of an exposure event beginning when lead is ingested. Blood-lead scores above 15 micrograms per deciliter ( $\mu\text{g}/\text{dl}$ ) do not necessarily imply evidence of a single exposure event. For the purposes of annual comparisons we have indexed observed blood-lead levels into five categories (Table 3). The five categories of blood-lead scores represent varying levels of indicated exposure and possible treatment-response measures. For this reason a blood-lead score

is but one of the variables considered in determining whether or not to treat a condor with chelation therapy (the process of removing lead by twice daily injections of calcium EDTA).

*Table 3. Blood-lead levels and management response guidelines.*

<b><i>Field Blood Lead Level (<math>\mu\text{g}/\text{dl}</math>)</i></b>	<b><i>Indication</i></b>	<b><i>Management Response</i></b>
0-5	Normal	None
5-14	Residual/Background/Recent Exposure Possible	None
15-29	Recent Exposure Likely	Monitor
30-64	Definite Recent Exposure	Hold/Recapture, Monitor and/or Treat
>65	Extreme Exposure	Hold and treat

It should be noted that the increased difficulty in trapping every individual in the free-flying population before and after the big-game hunting seasons has dictated that we adaptively manage for lead poisoning by sometimes altering our management response. For example, when both individuals of a breeding pair (incubating eggs, tending, or brooding chicks) have high levels of lead, the option of holding and treating them simultaneously could result in nest failure. Or, if a bird has been historically difficult to trap, we may choose to treat that individual at a lower blood lead level than the “hold and treat” threshold. Adaptive management continues to be key in the decision making process. Appendix B contains a flowchart of the lead poisoning treatment process.

During the reporting period, TPF radiographs have continued to reveal lead pellets and fragments in the digestive tracks of lead-poisoned condors and bullet fragments in deer and coyotes collected in the condor’s range.

For the purpose of annual comparisons of blood lead values and number of cases resulting in treatment, we provide the following data both as a percentage of birds trapped/tested, exposed, extremely exposed, and treated in Figure 4; and the actual number of birds tested, exposed, and treated in Table 4. Because the season of greatest exposure occurs towards the end of each calendar year, the sampling seasons continue into the following calendar year and are therefore represented by values from the end of one calendar year and the beginning of the next.

*Table 4. Number of condors in the wild, tested for lead exposure, showing evidence of exposure, extreme exposure, and those treated with chelation therapy (2007-2011).*

<b><i>Level of Exposure</i></b>	<b><i>2007-8</i></b>	<b><i>2008-9</i></b>	<b><i>2009-10</i></b>	<b><i>2010-11</i></b>	<b><i>2011-12</i></b>
In Wild	61	68	72	74	71
Tested	59	58	61	68	62
Recent Exposure Likely ( $>15\mu\text{g}/\text{dl}$ )	50	46	52	49	39
Extreme Exposure ( $>65\mu\text{g}/\text{dl}$ )	14	15	20	19	11
Treated for lead poisoning (chelated)	25	24	34	24	17

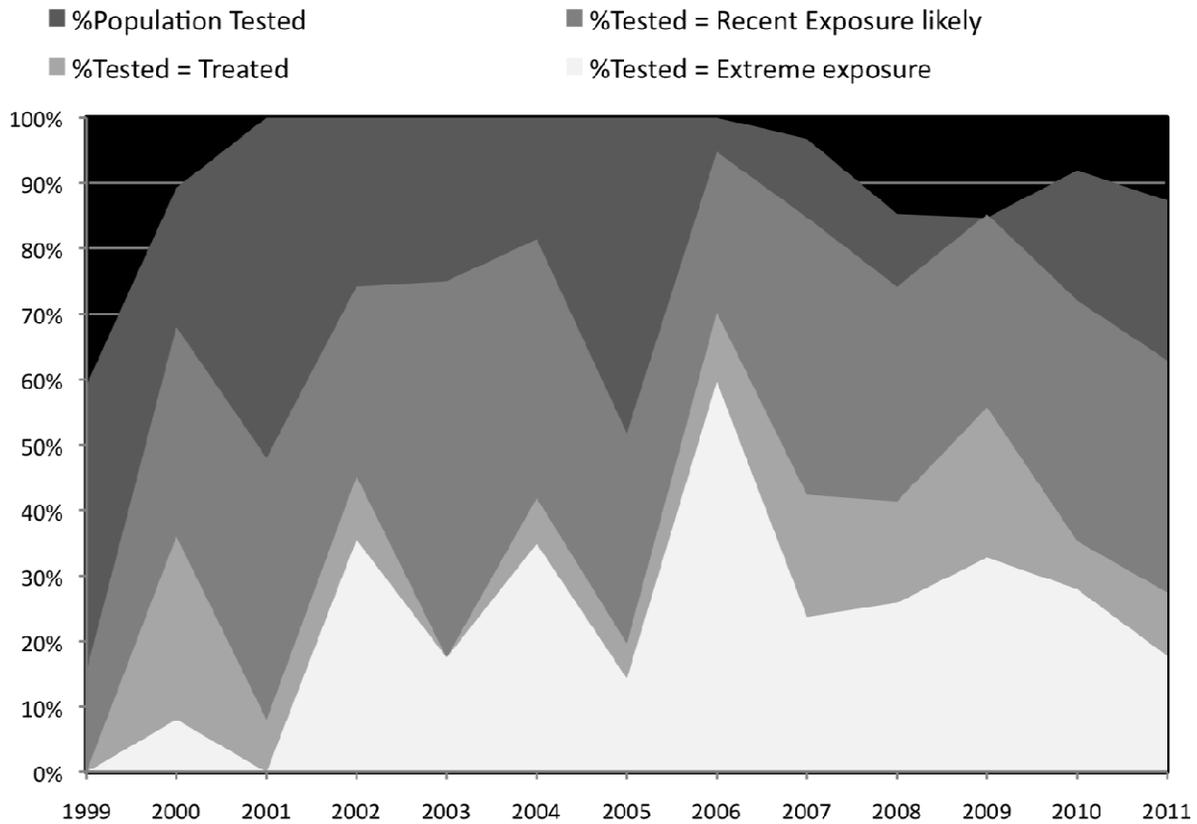


Figure 4. Percentage of tested condors in the population, levels indicating exposure, extreme therapy (1999-2010).

Condors 250M01 and 413M06 were pulled from the wild flock after they sustained injuries in Arizona. Condor 250M01 suffered from an injury to the wing, possibly a collision, and condor 413M06 cracked his bill while being transported between holding pens. Both condors received medical treatment, but only Condor 413M06 was deemed fit for re-release. Condor 250M01 was placed in the captive breeding program at the Oregon Zoo. This marked a first for the Southwest condor program, as no other bird had ever been deemed unreleasable due to an injury.

### Mortality

We recorded 18 fatalities in the first five-year period, 20 in the second five-year period, and 28 throughout the third five-year period (Tables 5 and 6). Circumstantial evidence suggests that two undiagnosed fatalities in the first five-year period were lead-caused. Predation and lead poisoning continued to be the prominent known mortality factors, but the birds in the “missing” and “unknown” mortality categories continued to increase. Of the 44 cases where diagnoses were possible since release began in 1996, 21 (48%) died of lead poisoning, 12 (27%) from predation, 3 (7%) from starvation, 3 (7%) from shooting, 2 (5%) from impaction, 2 (5%) from collisions, and 1 (2%) from infection. By applying the known rate of diagnosed fatalities identified as lead poisoned (48%) to the missing category (N = 17), it is reasonable to estimate that an additional 8 condors likely succumbed to lead poisoning. Further analysis of location

data, age structure, and seasonally available lead at the time birds went missing is underway to better predict the likelihood of lead poisoning in this category. Further analysis of the unknown category is needed to estimate the likelihood of lead-related deaths among these birds.

*Table 5. Condor mortality factors of the three five-year periods of the reintroduction program. (\*includes birds that died or were recovered from the field in the next calendar year that resulted from lead exposure in the previous reporting period.)*

<b>Mortality Factor</b>	<b>1996-2001</b>	<b>2002-2006</b>	<b>2007-2011</b>	<b>Total</b>
Coyote predation	4	1	4	9
Eagle predation	3	0	0	3
Lead poisoning	3	9*	9*	21
Suspected lead poisoning	2	0	0	2
Collision (power line)	1	0	0	1
Collision (vehicle)	0	0	1	1
Shooting	1	2	0	3
Starvation	1	2	0	3
Septicemia (blood poisoning)	1	0	0	1
Missing	2	4	11	17
Unknown	0	2	4	6
Impaction (coins)	0	0	2	2
<b>Total</b>	<b>18</b>	<b>20</b>	<b>31</b>	<b>69</b>

*Table 6. Condor mortalities of the third five-year period of the reintroduction program. (\*indicates a bird that died or was recovered from the field in the 2012 calendar year as a result of lead exposure in 2011).*

<b>Condor (Studbook #)</b>	<b>Source of Mortality</b>	<b>Sex</b>	<b>Age at Release (years)</b>	<b>Age at Death (years)</b>	<b>Days in Wild</b>
136	Impaction (coins)	F	0.6	11.0	3794
281	Impaction (coins)	F	0.8	5.9	1847
134	Missing	M	2.6	12.5	3619
276	Missing	M	1.5	6.6	1871
384	Predation (coyote)	M	3.3	3.6	87
372	Predation (coyote)	F	3.9	3.9	16
391	Predation (coyote)	F	3.9	3.9	4
404	Missing	F	1.9	3.1	429
527	Missing	Unknown	Wild hatched	0.2	75
127	Lead	F	2.1	14.7	4593
426	Missing	F	3.0	3.6	214
515	Missing	Unknown	Wild hatched	0.7	54
329	Lead	M	1.5	5.7	1540
472	Lead	F	Wild hatched	1.7	54
454	Missing	M	2.0	2.6	237

<i>Condor (Studbook #)</i>	<i>Source of Mortality</i>	<i>Sex</i>	<i>Age at Release (years)</i>	<i>Age at Death (years)</i>	<i>Days in Wild</i>
414	Unknown	F	2.5	3.7	442
485	Predation (coyote)	F	0.0	1.8	636
331	Missing	M	0.9	6.2	1958
195	Collision (vehicle?)	F	0.8	11.6	3938
420	Missing	M	1.8	4.6	995
459	Missing	M	Wild hatched	3.5	389
387	Unknown	M	1.3	5.7	1597
366	Lead	F	1.9	5.9	1466
476	Unknown	M	Wild hatched	3.0	880
558	Missing	Unknown	Wild hatched	1.0	371
223	Lead	M	0.7	11.0	3773
367	Lead	F	2.9	6.1	1149
270	Lead	M	3.4	9.1	2090
633	Unknown	Unknown	Wild hatched	0.4	140
314*	Lead	F	1.7	8.7	2556
253*	Lead	F	1.3	10.8	3445

In summary, shotgun pellets and rifle bullet fragments in animal carcasses have been the primary sources of lead contamination to condors in Arizona and southern Utah; eight carcasses with bullet fragments, one with a whole bullet, and five with lead shot have been identified in 14 of the 21 cases of death attributed to lead. Observations of lead pellets and fragments in the digestive tracks of live lead-poisoned condors often coincide with bullet fragments in rifle-killed deer and coyotes known to have been fed upon. Moreover, radiographs of the remains of deer killed with standard lead-based rifle bullets revealed a profusion of metal fragments as the normal condition (Hunt *et al.* 2006). With the aid of GPS-satellite telemetry, TPF found that an abrupt increase of blood lead levels has corresponded with increased use of deer hunting areas on the Kaibab Plateau and southern Utah since 2002. Spikes in blood lead levels have been associated with condor visitation to these regions during and just after the big-game hunting season.

### **Demography Overview**

We addressed the overall impact of the various mortality agents on the demography of the southwest condor population in a paper presented by Woods *et al.* (2007; see abstract 4 in Appendix C) at the American Ornithologists Union conference in August 2005. The authors concluded that, in the absence of releases, the condor population can be expected to increase under a projected rate of natural reproduction, but that increase would require the continuation of the current regime of lead testing and treatment. This suggests that, whereas the population can apparently tolerate the impact of the aggregate of other mortality factors, the added impact of lead-related deaths resulting from lack of treatment would likely prevent the establishment of a self-sustaining population. The difficulty of making such assessments with condors is that adult survival must necessarily be very high because very small proportional changes in mortality can have large effects on demographic trend. Given the relatively small size of the population, a small increase in the number of annual deaths can negatively impact the trend of the population.

Lead poisonings can be episodic, like those observed in summer 2000, and 2011, so the question of sustainability will remain unanswered for some time to come. Meanwhile, we will continue to closely monitor the population and to apply adaptive management whenever and wherever indicated.

Analysis of demographic data is an involved process, often including evaluation of the number of days each bird was free-flying in relation to its death, as described for example in Woods *et al.* (2007). A full evaluation using this process is underway for the past ten years of the project. We provide below a very simple listing of birds in the population and their survival to compare the current status with the initial “mortality rate” requirement of the rule designating the experimental population.

For the first five-year review period (1996-2001):

- 47 individuals were released; 18 (38%) died or went missing
- 2 (4%) birds were returned to captivity

For the second five-year review period (2002-2006):

- 26 individuals survived from the first period; 9 (35%) died or went missing
- 46 birds were released into the population; 10 (22%) died or went missing
- 2 (3%) released birds were returned to captivity
- 5 wild-hatched chicks were added to population; 1 (20%) died or went missing
- Overall, there were 77 individuals in the population; a total of 20 (26%) died or went missing; and 2 (3%) were returned to captivity.

For the third five-year review period (2007-11):

- 58 individuals survived from previous periods; 13 (22%) died or went missing
- 41 birds were released into the population; 11 (27%) of those died or went missing
- 5 (5%) released birds were returned to captivity
- 10 wild-hatched chicks were added to population; 7 (70%) of the ten died or went missing
- Overall, there were 109 individuals in the population; a total of 31 (28%) died or went missing; and 5 (5%) were returned to captivity.

For the first fifteen years of the reintroduction program (1996-2011):

- 134 individuals were released; 61 (46%) died or went missing
- 9 (7%) released birds were returned to captivity
- 15 wild-hatched chicks were produced; 8 (53%) died or went missing
- Overall, there were 149 individuals in the population; a total of 69 (46%) died or went missing; and 9 (6%) were returned to captivity.

In 44 of the mortality cases, necropsy was performed and cause of death diagnosed. Lead poisoning was determined in 48% (n=21) of the diagnosed cases of death. Given the latter, it is not unrealistic to assume that a percentage of the undiagnosed causes of death (n=25) could have been due to lead poisoning as well. Regardless of statistical assumptions, lead poisoning remains the leading cause of death with 21 condors having succumbed to toxicosis since 1996.

No confirmed mortalities due to lead occurred in the 2007-08 or 2008-09 exposure seasons. However, three mortalities due to lead occurred in the 2009-10 season, four in the 2010-11 season, and two during 2011-12 season. In 2011, a total of 62 of the 73 individuals in the wild (85%) were tested for lead. Thirty-nine of the 62 tested condors (63%) were found to have levels indicative of exposure. A total of 17 of the 62 tested condors (27%) were treated for lead poisoning. Eighteen percent of the individuals tested in 2011 were determined to have toxic blood lead levels. Similar levels of lead contamination in the population occurred during the other years of the review period.

Beyond the documented deaths caused by lead poisoning, one has to consider the additional impacts of lead on a wild population of condors. Condors generally begin to gather in communal areas during late winter. Social status is determined at this time, and the courtship process and establishment of pair bonds begins. Nest searching and egg laying begin shortly thereafter. We take advantage of this time and encourage the flock's presence at the release site by keeping a steady supply of food there in the form of dairy calves. Due to the seasonality of lead exposure, October through December, we must capture, test, and in some cases, hold and treat affected condors as soon as they arrive at the release site thus interrupting their normal process. Once a dominant male, for example, is taken from the mix, the hierarchy shifts, with each subordinate gaining another step. This in and of itself may explain inconsistencies in reproductive success observed over the past five years.

## **LEAD REDUCTION EFFORTS**

### **Introduction**

Lead toxicity was identified as a mortality factor among wild California condors in the 1980's (Janssen *et al.* 1986, Wiemeyer *et al.* 1988, Snyder and Snyder 1989, and Pattee *et al.* 1990). Consequently, lead exposure was recognized as a potential management issue for the Southwest condor reintroduction program (The Peregrine Fund 1996 and USFWS 1996a). During the first five years (1997-2001) of the program, isolated cases of lead toxicity did occur (Arizona Condor Review Team 2002 and Woods *et al.* 2007). However, it was only during the second five years of the program (2002-06) that lead exposure emerged as a critical management issue and the leading cause of condor mortality in this area (Southwest Condor Review Team 2007, Parish *et al.* 2007, Parish *et al.* 2009). During this same timeframe the key lead exposure pathway was identified: incidental ingestion of lead ammunition from animal carcasses (Hunt *et al.* 2006 and Chesley *et al.* 2006). In addition, condor lead exposure was specifically linked to the fall deer hunting season in northern Arizona and southern Utah (Hunt *et al.* 2007 and Parish *et al.* 2009). As outlined in the second five year review of the condor reintroduction program (Southwest Condor Review Team 2007), surveys were used to establish a baseline of hunter awareness regarding condors and lead poisoning (Responsive Management 2003a, Responsive Management 2003b, and DJ Case and Associates 2005a). We used focus groups to construct the most effective outreach message and communications plan (DJ Case and Associates 2005a, DJ Case and Associates 2005b, DJ Case and Associates 2006). Lead reduction efforts were first implemented in 2003 by the AGFD and TPF, with assistance from SCWG members and other project cooperators.

## **10(j) Voluntary Actions**

Starting in 2003, as part of an effort to reduce lead exposure in condors, a voluntary lead reduction program was implemented within the condor range in northern Arizona (Sullivan *et al.* 2007 and Sieg *et al.* 2009). Lead reduction efforts from 2002-06 were detailed in the second five-year review of the condor program (Southwest Condor Review Team 2007) and are summarized in Appendix D. Since 2006, lead reduction efforts within the Arizona condor range have been expanded and improved (Sieg *et al.* 2009). These efforts are outlined in this report.

All lead reduction efforts within the Arizona and Utah condor range have been voluntary in nature. The FWS's final rule to establish a 10(j) population of condors in northern Arizona (USFWS 1996a, p. 54050) states that: "Current and future land...uses such as...sport hunting...should not be restricted due to the designation of the nonessential experimental population of California condors." This document also affirms that (p. 54055) "The Service [FWS] does not intend to request modifications or restrictions to the current hunting regulations anywhere in the...experimental population area." FWS acknowledged in the final rule that condor deaths were expected from lead and other sources of mortality, but that these deaths would be compensated by natural and captive reproduction. To date, this compensation has come primarily from captive reproduction. Any change to the hunting regulations in the experimental population area in Arizona or Utah would require action by the states.

## **Lead Research**

Condor-lead research continued during this reporting period, with TPF and AGFD publishing several studies addressing lead exposure and lead reduction efforts (Chesley *et al.* 2009, Green *et al.* 2009, Hunt *et al.* 2009, Parish *et al.* 2009, Sieg *et al.* 2009). Abstracts of these papers are provided in Appendix C. Dissemination of this information was also accomplished through presentations at multiple professional conferences and meetings, including The Wildlife Society (TWS) national conference, The Arizona/New Mexico and Utah Chapters of TWS conferences, the Colorado Plateau Biennial Conference, and the Association of Fish and Wildlife Agencies and the Western Association of Fish and Wildlife Agencies meetings. TPF also hosted a 2008 conference in Boise, Idaho entitled "Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans" where international professionals convened to present lead research. Proceedings (Watson and Avery 2009) from this conference are available at [www.peregrinefund.org/subsites/conference-lead/](http://www.peregrinefund.org/subsites/conference-lead/).

## **Lead Reduction Efforts in Arizona**

As previously reported (Southwest Condor Review Team 2007, Sullivan *et al.* 2007, Sieg *et al.* 2009), the voluntary lead reduction program in Arizona was based on a carefully researched (Responsive Management 2003a, Responsive Management 2003b, and DJ Case and Associates 2005a) and targeted outreach and incentive-based implementation plan (DJ Case and Associates 2005b, DJ Case and Associates 2006). Outreach tools included educational presentations to sportsman's groups and letters to hunters outlining the scientific data linking lead ammunition to condor lead exposure. Message delivery was deliberate, using only sources deemed credible by hunters. "One voice" messaging was also employed, focusing on hunters' proud tradition of

wildlife conservation. The incentive-based component of this implementation plan consisted of a free non-lead ammunition program. Since non-lead ammunition was unfamiliar to many hunters, not available in all calibers, and more expensive than its lead counterpart, the AGFD started offering free non-lead ammunition to hunters within the core condor range in 2005.

### Free Non-lead Ammunition Program

Using monies from the state Wildlife Conservation and Heritage Funds (i.e., Indian gaming revenue and state lottery revenue), the AGFD administered a free non-lead ammunition program for the fall 2005-11 big game hunting seasons. Non-lead ammunition was offered to mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), and buffalo (*Bison bison*) hunters drawn for hunts within game management units 12AE, 12AW, 12B, with unit 13A added in 2006 and 13B added in 2009 (Figure 5). These hunts units incorporate the foraging areas most frequented by condors during the fall hunting season (Hunt *et al.* 2007 and Parish *et al.* 2009).

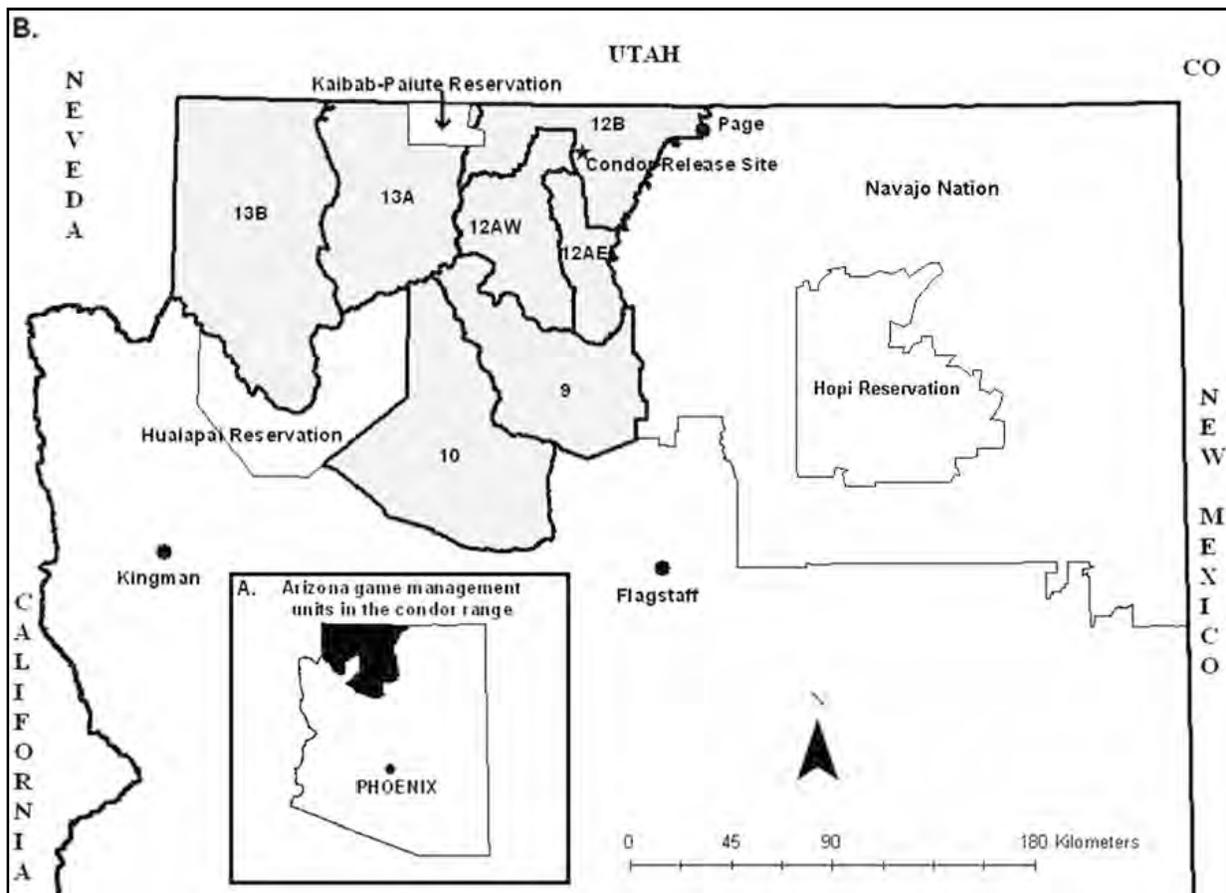


Figure 5. Arizona game management units within California condor range.

In addition to the above stated fall hunters, spring and summer unit 12A buffalo hunters were also eligible for free non-lead ammunition during this period. AGFD contracted with Sportsman's Warehouse (2005-08) and Cabela's (2005-11) to distribute the non-lead ammunition. Hunters could either obtain their ammunition from participating retail stores or via Cabela's mail order service. Hunters could obtain loaded rifle cartridges, bullets for reloading their own ammunition (added in 2006), or muzzleloading rifle sabots (also added in 2006). Coupons to obtain the free ammunition were mailed in late July through early August, initially after hunting tags were issued. However, starting in 2007, free ammunition coupons were mailed accompanying the hunting tags. An educational letter (see Appendix D) and DVD (added in 2007, see [www.azgfd.gov/condor](http://www.azgfd.gov/condor)) outlining condor lead poisoning and the free ammunition program were also included in this mailing. Coupons were redeemable through mid-November. The fall hunting season typically begins in mid-September and continues through early December of each year. Since the program began in 2005, between 1,400 and 2,300 hunters have been eligible for free ammunition annually, depending upon the number of hunting tags issued each year. Hunters were eligible for two free boxes of ammunition during 2005-08. Due to budgetary constraints, the free ammunition offer was reduced to one box per hunter from 2009-11.

As reported in the second five-year review (Southwest Condor Review Team 2007), the first two years (2005-06) of the free non-lead ammunition program resulted in 50–60% voluntary participation from Kaibab deer hunters. Although this represented an increase in lead reduction actions of over 55% in just two years, condor lead exposure data suggested that a 50–60% reduction in lead-laden carrion was not sufficient to maintain a self-sustaining population of free-foraging condors (Parish *et al.* 2007, Parish *et al.* 2009, and Green *et al.* 2009). Consequently, the AGFD and partners decided to intensify lead reduction efforts in 2007. Since a post-hunt survey (DJ Case and Associates 2006) indicated that the overwhelming majority (93%) of successful hunters were satisfied with the performance of non-lead rifle ammunition, efforts were focused on improving the main obstacles to non-lead ammunition use: lack of available calibers; lack of supply in retail stores; difficulty in identifying non-lead ammunition; cost; and more evidence linking condor lead exposure to hunting activities.

Representatives from AGFD and TPF met and developed several modifications to the outreach program to address these issues, including: a simplified outreach message including visual aids; lead reduction articles in Arizona sportsman's groups publications (including the Arizona Elk Society, Arizona Deer Association, Antelope Foundation, Bighorn Sheep Society, and Wild Turkey Federation); increased general media stories referring to lead reduction efforts; development and distribution of an educational DVD and brochure; increased field communication with hunters (about one AGFD outreach staff per 200 hunters with a goal of 80% hunter contact rate); in-store non-lead ammunition displays to aid hunters in locating non-lead ammunition (Figure 6); a follow-up letter reminding hunters to redeem their free ammunition coupon; and an incentive for hunters using lead ammunition to pack out their offal piles (gut pile raffle). The goal of these intensified efforts was to significantly increase hunter participation in the lead reduction program.



Figure 6. In-store non-lead ammunition displays in Arizona Cabela's and Sportsman's Warehouse stores.

### Gut Pile Raffle

Since loaded non-lead ammunition was not available in every caliber used by rifle hunters, and some hunters preferred to use the lead hand-loads they had customized for their rifles, a minority of hunters were using lead ammunition on their hunts each year. In these cases, AGFD asked the hunters to remove their game gut piles from the field so lead fragments in the gut piles would not be available to scavenging condors. Bagging up and packing out a gut pile is not a desirable act for most, therefore TPF and AGFD created the gut pile raffle as an incentive for hunters. Beginning in 2007, TPF donated \$600-\$1,000 worth of Cabela's gift cards to be raffled off to hunters who used lead ammunition and packed their gut piles out of the field. Three Cabela's gift cards were awarded annually. Trash bags and raffle flyers were distributed to hunters on the Kaibab Plateau during the fall deer hunts. Gut pile outreach efforts used one AGFD staff per 200 hunters, resulting in an in-field hunter contact rate of approximately 80% each year. Hunters were asked to bring their bagged gut piles to the Jacob Lake hunter check station where AGFD collected them. Gut piles were then disposed of at a landfill where they were immediately buried. Raffle winners were drawn at the end of each hunting season in December. Raffle winners were contacted by phone and gift cards were mailed to them by AGFD. Thank-you

letters were sent to all raffle participants. X-rays of actual gut piles removed by Kaibab hunters were included in this letter to demonstrate the amount of lead removed from the field.

### **Additional Lead Reduction Efforts in Arizona**

The AGFD and TPF have implemented numerous lead reduction outreach efforts in addition to the free non-lead ammunition program. All fall big game hunters (4,000-5,000 annually) in game management units 9 and 10 (secondary condor foraging range during the hunting season) were mailed letters from AGFD asking them to take lead reduction actions during their hunt. All fall and spring turkey hunters (1,500-2,500 annually) in units 9, 10, 12AE/AW/B, and 13A/B were also mailed similar letters each year. These letters addressed the fact that condors have died of lead poisoning by ingesting lead shot pellets in addition to lead bullet fragments. Outreach to varmint and small game hunters was also increased during 2007-11 by including in outreach materials x-rays of coyote and squirrel carcasses containing lead fragments. Educational talks were presented to several varmint calling groups and letters were mailed to general hunting license holders in the condor release area. Educational flyers and signs targeting varmint hunters were also posted around the Kaibab Plateau and Arizona Strip. General hunting license holders residing in cities adjacent to the condor release area were surveyed in 2008, to determine if lead reduction outreach efforts were effective. Over one third of the respondents said they took some lead reduction actions while hunting small game/varmints, or predators within the condor range.

The AGFD and TPF have staffed several non-lead ammunition booths at Arizona sportsman's events. Starting in 2006, the AGFD, partnering with ammunition manufacturers, has hosted a non-lead ammunition shooting booth at its annual Outdoor Festival at the Ben Avery Shooting Range in Phoenix. The public is given the opportunity to shoot non-lead rifle ammunition in various calibers free of charge. Ammunition manufacturers including Winchester and Federal have donated non-lead ammunition for this event. TPF has assisted this effort with lead and non-lead ammunition shooting demonstrations and bullet testing using ballistics gelatin and water jugs. The fragmentation rates of several different lead and non-lead bullets have been determined using this technique. The AGFD has also staffed a non-lead ammunition booth at the International Sportsman's Expo in Phoenix each year since 2007. Combined, these events reach over 2,000 people annually and have provided hands-on exposure to non-lead ammunition. AGFD staff also wrote an article for a national hunting magazine, *Boone and Crockett Magazine*, about the voluntary lead reduction program in 2008.

Lead reduction outreach efforts have expanded significantly since 2003. Post-hunt surveys (DJ Case and Associates 2006) and in-field hunter contacts have indicated that targeted outreach to the hunting community has been well received and, based on the numbers of hunters now using non-lead ammunition, has produced significant results. Most Arizona hunters contacted by AGFD are now familiar with non-lead ammunition and the voluntary lead reduction program – a significant change from survey results in 2003 (Southwest Condor Review Team 2007). The AGFD, TPF, NPS, and other cooperating partners now include the lead reduction message in all outreach efforts, from in-school presentations to campground talks. The lead reduction message has also been expanded to include all animal harvesting and dispatching activities, from hunting on public lands to putting down range and feral animals on private and tribal lands. During this

reporting period, AGFD staff presented an average of 38 condor talks and hosted approximately 8 condor booths at wildlife fairs each year, reaching 2,000-4,000 people annually, in addition to contacting almost 10,000 hunters each year. Voluntary lead reduction efforts implemented in Arizona are summarized by year in Appendix E.

### Results of Arizona’s Lead Reduction Program

Lead reduction program results for 2005-06 were reported in the second five-year review (Southwest Condor Review Team 2007). Hunter participation rates were approximately 50% and 60%, respectively. The intensified lead reduction efforts outlined in this report were successful in increasing hunter participation rates during 2007-11. Despite continued non-lead ammunition supply problems, participation rates increased by 20% in 2007, to approximately 80% voluntary participation from successful Kaibab Plateau hunters. Approximately 60% of hunters used non-lead ammunition, while 20% used lead ammunition but packed out their gut piles. A handful of hunters used lead ammunition but took head or neck shots. In this case, lead bullet fragments remain in the head and neck, not the gut pile (Hunt *et. al* 2006). Participation rates continued to increase in 2008, with almost 90% participation. Rates decreased slightly to 85% in 2009, a possible effect of reducing the free ammunition amount from two boxes to one. Rates were 87% in 2010 and 90% in 2011, with a record 77% of hunters using non-lead ammunition in 2011. Figure 7 summarizes the hunter participation rate of the free non-lead ammunition program and Table 7 provides detailed information by year, including the type of lead reduction action taken by hunters.

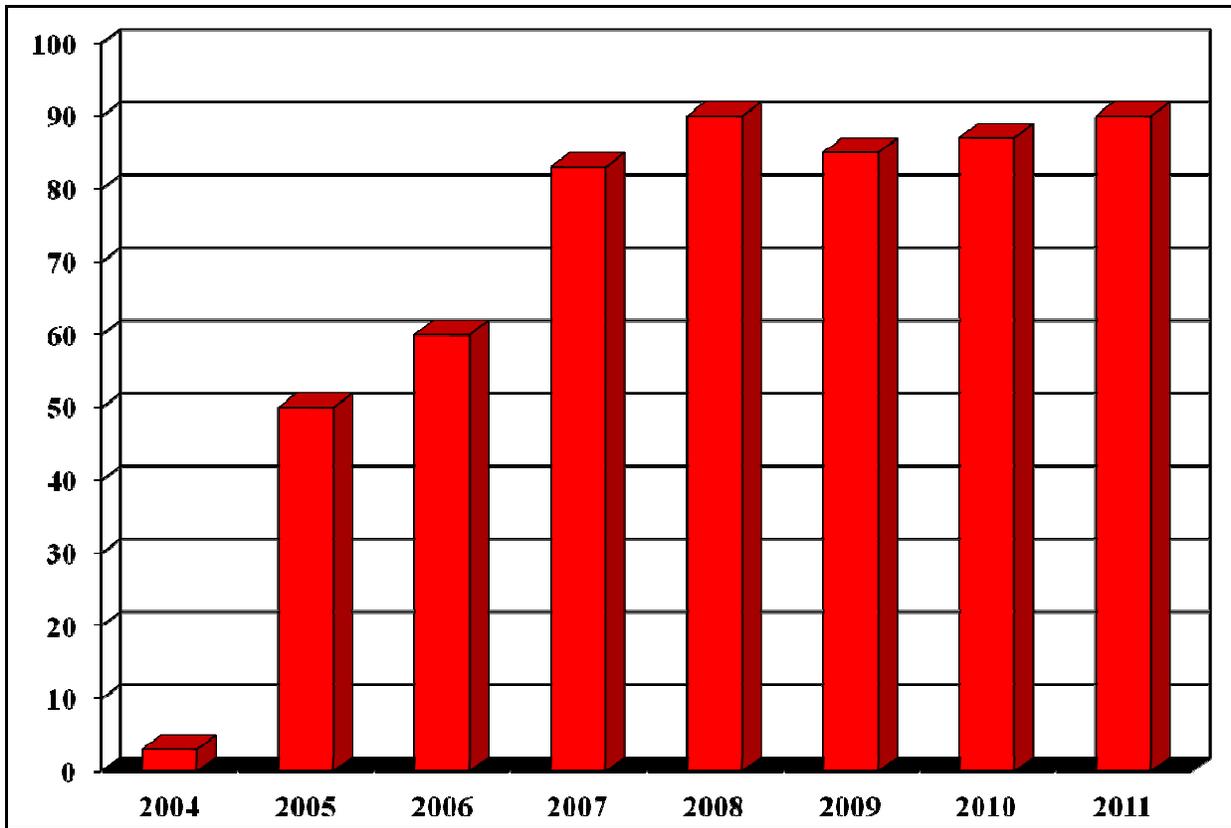
Table 7. Annual results of lead reduction efforts taken by successful Kaibab hunters.

Year	Successful Hunters	Took Lead Reduction Actions	Used Non-lead Ammo	Took Head or Neck Shot	Packed Out Gutpile	% Hunters Using Lead & Packed Out Gutpile	Took No Lead Reduction Action
2011 <sup>3</sup>	482	436(90%)	370(77%)	6(1%)	60(12%)	57%	46 (10%)
2010 <sup>3</sup>	581	508 (87%)	412 (71%)	10 (2%)	86 (15%)	51%	73 (13%)
2009 <sup>3</sup>	717	607 (85%)	476 (66%)	12 (2%)	119 (17%)	52%	110 (15%)
2008 <sup>3</sup>	910	814 (89%)	654 (72%)	13 (1%)	147 (16%)	60%	96 (11%)
2007 <sup>3</sup>	767	633 (83%)	465 (61%)	9 (1%)	159 (21%)	54%	134 (17%)
2006 <sup>2</sup>	548	329 (60%)	316 (58%)	6 (1%)	7 (1%)	3%	219 (40%)
2005 <sup>2</sup>	909	455 (50%)	455 (50%)	N/A	N/A	N/A	454 (50%)
2004 <sup>1</sup>		<5%					>95%

<sup>1</sup>2004 data obtained from Jacob Lake check station survey of successful hunters.

<sup>2</sup>2005-2006 data obtained from AGFD Kaibab deer harvest surveys and DJ Case post-hunt survey of Kaibab hunters (DJ Case and Associates 2006).

<sup>3</sup>2007-2011 data obtained from Jacob Lake check station survey of successful Kaibab hunters



*Figure 7. Percentage of successful Kaibab hunters who took lead reduction actions during their hunt each year.*

### **Lead Reduction Efforts in Utah**

In response to the continued increase in condor use of Utah habitats and the concurrent evidence that condors were ingesting lead while in the state, UDWR began development and implementation of a non-lead ammunition program to compliment the program AGFD had established in 2005. Though based substantially on AGFD’s program, Utah’s non-lead ammunition program differed in two significant ways. First, as the hunt units in question were open units, UDWR was not able to individually contact every hunter who would be hunting in condor range. Second, UDWR offered a rebate on the purchase of non-lead ammunition rather than a free box of such ammunition.

Hunters were first alerted to the Utah non-lead ammunition program via a sidebar in the 2009 Utah Big Game Guidebook. An expanded, full-page version of that sidebar was published in the 2010 and 2011 Utah Big Game Guidebooks. In conjunction with the guidebook sidebars, representatives of UDWR and TPF attended the International Sportsmen’s Exposition in Salt Lake City in 2009 and 2010. These representatives distributed information on condors and the impacts of lead ammunition on the population. They also discussed availability and performance of non-lead ammunition. In the process, representatives of sportsman’s organizations were contacted at these expos to try to gain support from sportsman’s groups and elicit their assistance

in educating hunters about the use of non-lead ammunition in condor range. Following these contacts, UDWR employees attended eight sportsman's group banquets from February through June 2010 to promote the non-lead ammunition program and condor conservation actions. Although no formal surveys were conducted at these events, most hunters indicated they were aware of condor recovery efforts and many said they would be willing to use non-lead ammunition in condor range.

From 2007 through 2011, UDWR also submitted news releases to local media outlets. One Salt Lake City television station with statewide coverage (KSL) produced a non-lead ammunition spot that aired in 2007. Additionally, UDWR personnel appeared on the local Cedar City talk/news radio station (KSUB) on several occasions to discuss condor issues. Finally, several non-lead related articles were printed in various local newspapers.

Because the Utah Wildlife Management Units (WMU) most commonly used by condors were open to all general season deer and elk hunters, UDWR was, unlike AGFD, unable to individually identify all those who would be hunting in condor range. In order to identify the hunters most likely to hunt in condor range, UDWR focused on those hunters likely to hunt in the Zion WMU – the WMU in which almost all condor activity was focused. Four questions were added to the on-line big game hunt application process to single out these hunters: *Do you plan to hunt the Zion WMU? Do you typically hunt deer, elk or both? Do you currently hunt with non-lead ammunition? Would you consider hunting with non-lead ammunition?* Of the 33,624 respondents, 15,674 indicated they already hunt with non-lead ammunition, though no attempt was made to verify answers.

Although UDWR had initially planned to provide hunters a coupon redeemable for a free box of non-lead ammunition if they hunted in condor range, available funding proved insufficient to support such an effort. Ultimately, UDWR offered a \$25.00 rebate toward the purchase of a box of non-lead ammunition of the hunter's choice when the program was launched in 2010.

As a result of the hunter application survey, UDWR identified 2,000 potential Zion WMU hunters in 2010. Each of these hunters received a letter explaining the non-lead ammunition program. The letters included a coupon the hunters could return to UDWR for a \$25.00 rebate if they provided evidence (copy of store receipt and the label and UPC symbol from the box of non-lead ammunition) they had purchased non-lead ammunition for the 2010 big game season. A total 100 individuals returned their rebate coupons. In fall 2011, approximately 1,529 letters and rebate coupons were mailed to potential Zion WMU hunters. Only 69 hunters returned their coupon to UDWR to claim the rebate. In both 2010 and 2011, a handful of hunters who had not received rebate coupons in the mail asked to be included in the program and they were also provided rebate coupons.

UDWR has recently implemented a draw system for deer tags in southern Utah and will now be positioned to implement a program focused on communicating with hunters in the condor 10(j) area. Figure 8 depicts the three Utah WMU's in which condor activity is centered. The Zion WMU is considered the core range of the condors in Utah and the unit in which lead reduction efforts will be focused.

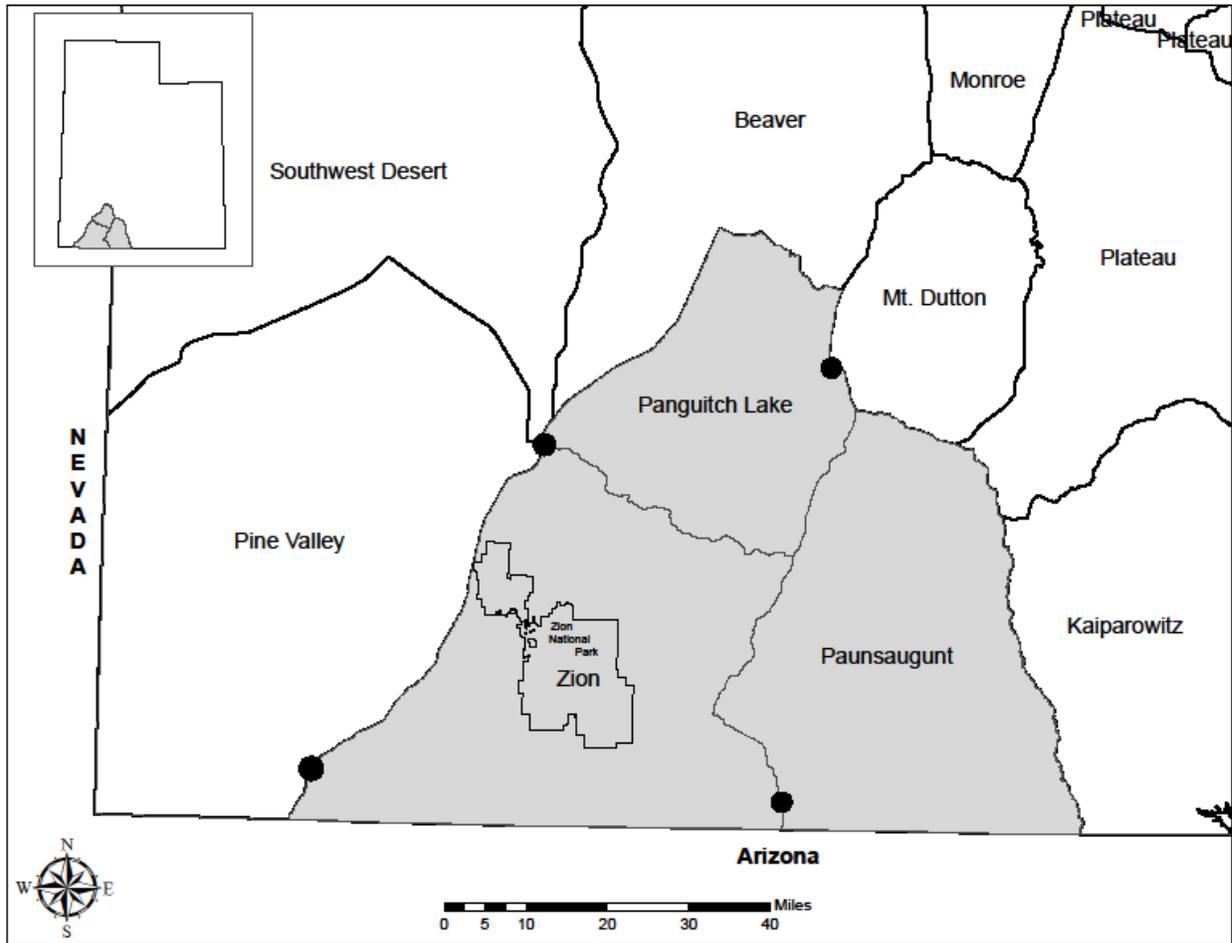


Figure 8. Utah Wildlife Management Units within California condor range.

In August 2011, UDWR, TPF and Zion NP, with the assistance of the Institute for Wildlife Studies, hosted two non-lead shooting and education programs at the Washington County Shooting Range near Hurricane, Utah. Those in attendance were shown how fragmentation differed between lead and non-lead bullets and were given the opportunity to shoot non-lead ammunition to evaluate effectiveness for themselves. Attendance was less than hoped for.

In addition to the non-lead ammunition program offered to hunters, UDWR policy on firearms use was changed to require the use of non-lead ammunition for non-law enforcement activities. UDWR also coordinated with the U.S. Department of Agriculture (USDA) Animal and Health Inspection Service (APHIS) Wildlife Services to assure that only non-lead ammunition would be used for their predator control operations in condor range.

## **Other Cooperator Lead Reduction Efforts**

The AGFD continued to provide non-lead ammunition to law enforcement officials and other professionals who may dispatch injured animals within the condor range, including the Coconino County Sheriff's Office, Navajo Nation Wildlife Services and Animal Control, and ranchers on the Kaibab Plateau. Project cooperators including the AGFD, NPS, BLM, USFS, and FWS also either dispatch animals in condor range with non-lead ammunition or remove carcasses from the field. Wildlife Services also initiated a lead-free protocol for their activities within the condor range (see the USDA APHIS-Wildlife Services Activities section).

Cooperator outreach activities included implementing the "one voice" lead reduction outreach message in all condor presentations to the public. TPF conducts approximately 50 condor presentations in Arizona and Utah annually and Grand Canyon and Zion NP staff provide daily condor talks during the spring through fall months. Grand Canyon NP also hosted an outreach workshop in 2011 where lead reduction outreach tools were discussed in depth by project cooperators and other interested information and education professionals. The Kaibab National Forest (Kaibab NF) requests that all permitted hunting outfitters and guides have their clients use non-lead ammunition on their hunts within the North Kaibab District. Kaibab NF staff also helps AGFD distribute lead reduction information to hunters during the fall hunting season. The BLM has provided significant funding to both AGFD and TPF towards lead reduction efforts. Tribal wildlife agencies from both the Navajo Nation and Hopi Tribe have distributed lead reduction literature to hunters on their lands.

## **Discussion**

The demand for non-lead rifle ammunition has steadily increased since 2005 (due in part to lead reduction programs in Arizona and California as well as the positive reviews of copper bullets). Manufacturers like Federal Premium, Winchester, Weatherby, Hornady, Remington and Cor-bon responded by increasing the number of calibers loaded with non-lead bullets as well as the quantity of available ammunition. Popular rimfire rifle calibers became available to hunters in 2009 (although considerably more expensive than lead rimfire ammunition). In 2005, Barnes Bullets was the only manufacturer of non-lead hunting bullets. By 2009, Nosler and Hornady also started manufacturing non-fragmenting copper alloy hunting bullets. Barnes also started producing loaded ammunition in 2010. Although non-lead rifle ammunition still only represents a small percentage (about 10%) of all rifle ammunition and supplies run out each year, by 2011, non-lead ammunition supplies dwindled at similar rates to that of equivalent lead ammunition.

Although voluntary lead reduction efforts have significantly reduced the amount of lead available to condors in Arizona (Green *et al.* 2009, Sieg *et al.* 2009), the Southwest condor reintroduction program has yet to observe a corresponding reduction in condor lead exposure rates (see Table 4 and Figure 4). Although 80% to 90% of hunters in much of the Arizona portion of condor range have participated in the voluntary program since 2007, hunter participation rates in southern Utah's lead reduction program are significantly lower (about 5%). Condor foraging in southern Utah has increased considerably since 2004 (see Figure 3). Additionally, foraging in Utah during the fall hunting season has risen consistently since 2005.

This shift in condor movement provides a likely explanation for why lead exposure levels have remained essentially static throughout this reporting period rather than declining.

Although the amount of available lead decreased significantly in Arizona, the risk of lead exposure in Utah remained about the same while condor activity in that state increased drastically. Condors frequently travel between Arizona and Utah during the fall hunting season, making it difficult to determine in which state lead exposure events are occurring. Therefore, the efficacy of voluntary lead reduction efforts in Arizona cannot be assessed until similar results are achieved in Utah. Models have suggested that simultaneously successful voluntary lead reduction efforts in Arizona and Utah could result in a level of condor mortalities due to lead toxicity (Green *et al.* 2009) that would not significantly affect the overall population.

California has enacted a mandate to address the condor lead exposure issue in that state. The Ridley-Tree Condor Preservation Act was passed in 2007, in response to a 2006 pending lawsuit to ban lead ammunition in California. Implemented in July 2008, the Ridley-Tree Condor Preservation Act banned lead ammunition for game hunting (deer, wild pig, elk, black bear, pronghorn antelope, coyote, and ground squirrel) within the historic condor range of California (see the California Department of Fish and Game [CDFG] website). The purpose of the regulation change was to reduce the potential for lead poisoning of condors by eliminating lead fragments in carcasses of hunted species (CDFG 2010).

Although one study has documented significant reductions in blood lead concentrations in golden eagles and turkey vultures at study sites in the lead ban area (Kelly *et al.* 2011), data on the effectiveness of the lead ban on California condors has not been sufficient to draw conclusions regarding a “cause and effect” relationship (CDFG 2010). Since the lead ban was implemented in 2008, the condor population in California has experienced both the highest and lowest seasonal lead exposure rates since reintroduction efforts commenced (CDFG 2009b and 2010), and five condors have died of lead toxicity (Joseph Brandt, FWS pers. comm.). Although a 99% hunter compliance rate was reported by CDFG (2009a), condor program biologists and field contacts indicate a compliance rate closer to 75% (Jim Pettersen, NPS and Jesse Grantham, FWS pers. comm.). Most hunters on public lands have complied with the lead ammunition ban; however, ammunition use on private ranches has been difficult to enforce, and in many cases more hunting activity occurs on private ranches (Jim Pettersen, NPS pers. comm.), especially pig depredation and varmint hunting. Due to the large tracts of private land within the condor range, the amount of lead ammunition use that still occurs in the ban area is unknown.

The lead ammunition ban has resulted in considerable tension between the hunting community and condor recovery program (Kelly *et al.* 2011; Jim Pettersen, NPS and Jesse Grantham, FWS pers. comm.). Many hunters considered the lead ban an anti-hunting measure, citing the fact that no non-lead alternative to lead .22 rimfire ammunition (used for varmint and small game hunting) was available on the market when the Ridley-Tree Condor Preservation Act was enacted. To help improve relations between the condor recovery program in California and the local hunting and ranching community, as well as to increase non-lead ammunition use on private lands, condor program personnel in California are employing considerable education and outreach efforts. These grass roots efforts have convinced several skeptical hunters of the legitimacy of lead reduction efforts (Jim Pettersen, NPS pers. comm.).

Two conclusions can be drawn from comparing the different lead reduction approaches taken in Arizona and California. To date, neither the voluntary nor mandatory approach has solved the lead poisoning problem in condors. Second, regardless of which approach is executed, a comprehensive education and outreach program is the key element to gaining widespread support and participation from the hunting and ranching community.

## **ADMINISTRATION**

### **Coordination among Program Cooperators**

The 1996 MOU established a framework for cooperation among the various state and federal agencies, tribal governments, and TPF involved in the reintroduction of California condors in northern Arizona and southern Utah. In 2005, a new MOU was signed by the “primary” cooperators who are active in the program. The new MOU does not include original cooperators who had not been active, but it does allow for those and others to be added to the list of cooperators as needed. This current MOU was signed by AGFD; UDWR; FWS Regions 1, 2, and 6; TPF, BLM; NPS; and USFS. In summer 2010, the seven principal cooperators signed Amendment 1 to the MOU to extend cooperation with the program to September 2015.

The SCWG is chaired by representatives of the AGFD and UDWR. The cooperators meet or confer regularly each spring and fall, and incidentally throughout the year as needed. The FWS California Condor Program Coordinator usually participates and shares information about condor recovery efforts program-wide.

Coordination with the California program on a field level has improved due to regular meetings of field staff to share information. However, the need for basic coordinated and consolidated data reporting throughout the entire California Condor Recovery Program still exists.

AGFD continues to provide a full time California Condor Coordinator to work with the TPF biologists on day-to-day management, and to improve outreach efforts and program coordination. UDWR does not have a full-time condor coordinator, but provides two biologists and two outreach specialists to support the program in conjunction with their other duties. FWS provides part-time support from Ecological Services personnel, primarily in Arizona, to coordinate management and public information through the FWS at field and regional levels.

Grand Canyon NP’s participation in the SCWG has been intermittent. This has resulted in their more limited involvement with the SCWG except on items of immediate interest. NPS interpretive staff offers daily condor education programs during the summer. Grand Canyon NP also provided additional support through on-site field monitoring.

SCWG representatives have informed and briefed the Hopi Tribe, Navajo Nation, and Kaibab Band of Paiute Indians on the program and ongoing projects. Additionally, FWS made a concerted effort to invite representatives from Hopi, Navajo, Kaibab Paiute, Southern Utah Band of Paiutes, Hualapai and Havasupai tribes to the spring 2011 coordination meeting. Several of these tribes participated.

As part of this review, SCWG participants were asked to comment on their perspectives regarding coordination and cooperation. Responses are presented below.

UDWR reported that communication within the group continued to be timely, positive and effective. The shared chairing of SCWG by AGFD and UDWR has been successful. One area of communication that caused some confusion was in cooperative news releases. SCWG cooperators give one another the opportunity to review news items before they are released to media outlets. This normally works well with all parties making their best efforts to provide rapid and productive review. Periodically, however, the question of what needs to be vetted and who needs to comment becomes muddled – most often as a result of changes in personnel or responsibilities. UDWR had a brief period of internal adjustment during a change in outreach direction. Overall, however, releasing news items cooperatively has worked well and should continue.

Coordination within Utah continued to fall primarily to UDWR. UDWR disseminated pertinent information to interested parties in Utah and these interested parties were able to attend or call in to all SCWG meetings. The Utah Condor Working Group, organized by UDWR, met two times and conducted two conference calls during the review period. Future management options were discussed and lines of communication were established. Management ideas were discussed, but a proposed joint management document did not progress beyond outline form. Nonetheless, the Utah cooperators maintain communications and continue to be informed of program progress and direction.

The BLM Arizona Strip District reported that the BLM continues to see the coordination among cooperators and commitment fulfillment as very successful. A BLM representative participates in the SCWG meetings and has been able to increase agency budgetary contributions to the reintroduction project over the review period. BLM believes that the continued participation of the field crew from TPF and a full-time AGFD condor biologist is imperative to the successful re-introduction of the California condor.

TPF reported that they continue to be pleased with the excellent coordination among the partners. TPF acknowledges the involvement of AGFD in response to lead issues. In addition to having a full-time condor biologist on staff, the AGFD has provided financial support for a non-lead ammunition distribution program for hunters in the range of condors. TPF is also appreciative of AGFD support of research efforts including funding for satellite transmitters which the UDWR contributed to as well. TPF believes AGFD continues to make tremendous strides in advancing public awareness of condors through their education programs. TPF believes that it is critical that the UDWR increase lead-reduction effort through public awareness and support because their participation will play a major role in the success or failure of establishing a self-sustaining population. TPF appreciates the fact that the BLM is now making significant financial contributions toward the release program, and the FWS continues to make funding available through a grant agreement originating in the Department of the Interior. Lead poisoning from spent ammunition proves to be the most significant obstacle to establishing a self-sustaining population of condors in the region. TPF believes the partners must work closely to find ways to eliminate the sources of lead in order for the program to succeed. TPF believes that,

without the lead problem, the success of the program is assured with wild production occurring and the near elimination of some mortality factors as a result of adaptive management.

The Kaibab NF is an active member of the SCWG and a cooperating partner on the MOU. The North Kaibab Ranger District wildlife biologist is the designated USFS representative and participates regularly on conference calls and annual meetings.

Public outreach and education is conducted in a variety of ways. The Kaibab NF maintains a web link to The Peregrine Fund's California Condor Restoration website. This comprehensive website about condors and the reintroduction effort also has a contact list for key personnel and cooperating partners, which includes the Kaibab NF. Other outreach efforts include postings, signs and information cards distributed to the public by USFS personnel explaining the harmful effects of lead ammunition.

As part of the Special Use Permit for Hunting Outfitters and Guides on the North Kaibab Ranger District, the permittees are requested to have their clients use non-lead ammunition, offered by the AGFD, or to take specific measures to prevent exposure of condors and other wildlife to lead shot such as removing or burying gut piles.

The Kaibab NF has worked with the FWS to develop measures to minimize the risk of harm to condors that could occur near project-related activities, and requires these measures be followed by employees, contractors, and partners. For example, mitigations were used to reduce impact to the condor in the Navajo Transmission Line Environmental Impact Statement (EIS). The EIS called for high-visibility wire to minimize avian collisions and a monitoring/adaptive management approach to retro-fit the line if collisions with condors are documented.

The Kaibab NF also provides field, logistical, and funding support to TPF. In 2009, the Kaibab NF funded support (\$10,000) for monitoring released birds to study movement and locations of the birds. Additionally, the Kaibab NF has worked with TPF to have field equipment and personnel available if needed for distribution of winter feed.

FWS is the federal agency with primary responsibility for recovery of the California condor. As such, FWS provides oversight and management support for recovery activities and funding for captive breeding operations. However, FWS depends on the SCWG partners for implementation of field operations and land management activities. FWS biologists in both Arizona and Utah have responsibilities in the Southwest condor recovery program including compliance with the ESA and assistance with and tracking of recovery implementation. FWS has worked with the SCWG cooperators and other agencies to develop a list of conservation measures that can be implemented during projects and other activities within the 10(j) area in order to minimize the likelihood of disturbance or injury to condors. These have included a range of projects from broad-scale forest management and travel management plans to site-specific construction projects. FWS participates in "one-voice" messaging, coordinating with the other partners on news releases and public outreach. FWS has worked with TPF and UDWR in an attempt to mitigate complaints of private property damage by condors in the Kolob, Utah area. FWS also worked with TPF and other agencies to ensure that federal permitting requirements related to management of condors were being met. Communication and coordination among the partners

provides a forum for discussing current and evolving issues facing the program, and developing possible solutions to these issues. FWS also maintains an information page on the Arizona Ecological Services website for public documents about the Southwest condor program.

### **Other Coordination**

In addition to members of the SCWG, Audubon Arizona and Iron and Washington counties in Utah provided substantive comments regarding their roles in condor reintroduction.

Regarding perception of compliance with commitments, Audubon Arizona commended the excellent working partnerships with TPF, the Phoenix Zoo, Liberty Wildlife, and AGFD. They also stated that the nonessential experimental population designation provided opportunities to chelate lead and otherwise enhance restoration of the species. They consider adult mortality due to lead ingestion a high priority for resolution. Audubon Arizona reported that public acceptance of the recovery program is high. However, they perceive that the general public is unaware of the severity of the lead poisoning problem, and the public does not discern that mortality levels necessitate repetitive releases of captive-bred condors. Audubon Arizona reported that they hosted a workshop on the Southwest condor program on February 23, 2008 in order to provide information about the program and encourage use of non-lead ammunition, and expended \$2,175 to support condor recovery during the review period. They have also posted information on their web page ([www.az.audubon.org](http://www.az.audubon.org)).

A number of specific comments submitted by Iron and Washington counties, Utah have been addressed in Appendix A. In addition, Iron County recommended the five-year review address the goals of the 1996 California Condor Recovery Plan, and the nine points mentioned in the 1997 Implementation Agreement with Local Governments (Agreement), Parties section, Item 7. They also stated they have received very little information or updates regarding the program and would like to receive an annual summary of program progress within county boundaries. These recommendations have been incorporated into this review. Iron County stated that they are not aware of any land use issues on federal lands within the county, and that as long as the program continues under the MOU and Agreement, there will be little resistance to continue. However, if attempts are made to modify the special rules of the nonessential population designation, or if more restrictions in land uses occur because of the condor, the public in the county would oppose such efforts.

Washington County, Utah reported that Zion NP and surrounding areas in Washington County have continued to see increased use by condors. The public is interested in seeing condors and there is small economic benefit from such interest. Washington County stated that the 10(j) status of condors has allowed a good cooperative effort resulting in success while not unduly restricting human activity. They support the 10(j) status and recommend that status include the entire area that condors are known to use. They requested that the 10(j) area be extended to include all of Washington County to ensure wider public support and continue progress with the reintroduction.

## **Compliance of Federal Agencies with Sections 7(a)(1), 7(a)(2), and 7(a)(4) of the Endangered Species Act**

In the report for the first five-year review, this section included an extensive outline of the responsibilities for compliance with the ESA in relation to the nonessential experimental population of California condors. That report listed the responses from involved agencies regarding their knowledge of their responsibilities. That report also listed most of the section 7 consultations conducted with those agencies during the first five years of the reintroduction program. For the most part, the responses of the agencies indicated that the responsibilities were clear and understood.

This section in the second five-year review included responses from four agencies regarding section 7 compliance. The second five-year review also included a clarification and an integration of the final rule designating the experimental population, section 7 responsibilities, and the Agreement.

For this third five-year review, agencies were asked to report about effects on land use practices due to the presence of the condor, and to list and describe projects for which section 7 consultations were conducted during 2007-11. Aside from the responses reported in the Coordination sections above, no issues or impacts regarding section 7 compliance were received from any agencies.

## **Compliance with the 1997 Agreement between the Fish and Wildlife Service and the Coalition of County and Local Governments**

The purpose of this Agreement is to ensure to the maximum extent possible that current and future land, water, or air uses within the experimental population area are not affected as a consequence of the release of California condors in northern Arizona/southern Utah, and to promote the recovery of the California condor. Iron County requested that as part of this review, the FWS identify their compliance with the Agreement. The final rule that established the nonessential experimental population (USFWS 1996a, p. 54050) states that the program will be managed in accordance with the MOU and the Agreement; therefore, as part of this review, we have included the specific items in the Agreement and their status below.

*The FWS agreed:*

- 1. All released condors and progeny will constitute a nonessential population for the time they are present in the experimental population area, or until the condor is delisted.*

**Status:** The southwest population remains a nonessential experimental population as designated in the final rule (61 Federal Register 54044-54059; 16 October 1996).

- 2. All condors and progeny found within the experimental population area will comprise the nonessential experimental population for the entire duration which condors are present in the population area, or until the condor is delisted.*

Status: FWS is not considering any changes to the 10(j) area or the status of condors within the area.

- 3. Before condors are released, the FWS will enter into a MOU among affected Federal agencies, State agencies, and Tribes to establish a general framework for cooperation and participation within the experimental population area.*

Status: The original MOU has been renewed and extended and continues to guide the activities of the SCWG. Affected tribes have been invited to participate in the SCWG and the MOU but are not currently signatories.

- 4. To relocate any condors that move outside of the nonessential experimental population area. In the event that a condor moves outside of the nonessential experimental population area it will be captured and returned to the area or placed in a captive breeding facility. All relocations from outside the nonessential experimental population area will be coordinated with cooperators and conducted with the permission of landowners.*

Status: Although condors occasionally move outside the boundaries of the 10(j) area, they have returned on their own. No condors have been captured to return them to the designated area.

- 5. To relocate condors in the nonessential experimental area, either to improve their survival or at the request of an affected party. Adverse effects and requests for relocations will be documented, reported, and resolved expediently. All relocations in the nonessential experimental population area will be coordinated with cooperators and conducted with permission of landowners.*

Status: Most condors in the population are trapped annually for the purpose of blood lead testing and treatment, as needed, to improve their survival. We have not received any requests to relocate condors. UDWR and TPF have been contacted regarding problem birds on private property in southern Utah; these birds were hazed by permitted agency personnel and property owners are encouraged to contact TPF or UDWR if problems continue.

- 6. The experimental area will be monitored. Any diseased or injured condors will be captured, evaluated, treated, held in captivity, and/or re-released. Condors will be examined before release and poor candidates will not be released.*

Status: Population monitoring and capture and treatment of sick and injured condors continue. Release candidates are not released if they exhibit any characteristics that would not allow them to survive in the wild.

- 7. Review the progress of the reintroduction project and recovery plan objectives within the first five years after the initial release and every five years afterwards. If after five years, the project is experiencing a 40 percent or greater mortality rate, or released condors are not finding food on their own, serious consideration will be given to terminating the*

*project and revocation of the 10(j) rule. Updates and new data will be provided at the scheduled annual meeting by the parties to this agreement.*

Status: The Southwest condor program has been reviewed every five years. The status of condors, including mortality rates, is provided in each review. The FWS has not scheduled annual meetings with the other parties to the agreement. One of the recommendations of this review is to hold an annual meeting with representatives of counties within the 10(j) area.

8. *To ensure to the maximum extent practicable that current and future land, water, or air uses and activities should not be restricted due to the designation of the nonessential experimental population or the presence of condors. No operational restrictions will be placed on currently permitted activities due to the presence of condors on BLM grazing allotments proximate to Vermilion Cliffs leased by Rich, Sturdavant, Carter, and Schoppmann. Any structural modifications needed to protect condors will be paid for by the appropriate MOU cooperator with the approval of the landowner in accordance with all applicable procedures.*

Status: The FWS and BLM have developed a list of voluntary conservation measures that may be applied during activities within the 10(j) area. No operational restrictions are required solely due to the presence of condors, and no structural modifications have been made within the area solely for the protection of condors.

9. *Condors located in National Parks or National Recreation Areas will be treated as a threatened species and subject to the consultation requirements of section 7(a)(2) of the ESA. For analyses under section 7(a)(2), the Service will evaluate the effects of an activity within National Park System lands in the nonessential experimental population area against the entire condor population and not solely against the southwest population. The FWS will relocate any condor within the nonessential experimental area including National Park System lands to avoid conflicts with ongoing or proposed activities or when relocation is requested by an affected landowner.*

Status: The FWS conducts section 7 jeopardy analyses in accordance with current regulations and procedures. No requests for relocation of condors have been submitted to the FWS.

10. *The FWS does not intend to pursue a change in the nonessential experimental population designation or modification of the nonessential experimental population area boundary without consulting with and obtaining full cooperation of affected parties and cooperators. The FWS does not intend to change the status of the nonessential experimental population until the condor is recovered and delisted or the reintroduction project is unsuccessful and the rule is revoked. Critical habitat will not be designated for nonessential populations. If legal actions or other circumstances compel a change in the nonessential experimental population designation or require designation of critical habitat in the area, then, unless parties to the MOU and the Agreement agree that the birds should remain in the wild, all condors will be removed from the nonessential experimental population area and the final rule will be revoked. Changes in the legal*

*status or removal of the population will be made in compliance with all applicable Federal procedures.*

Status: The FWS continues to agree with this item and is not contemplating or proposing any changes to the legal status of condors in the southwest population.

*11. Throughout the nonessential experimental population area, person(s) will not be in violation of the Act for unavoidable and unintentional take of a condor, when such take is non-negligent and incidental to a lawful activity, such as hunting, driving, or recreational activities, and the take is reported promptly.*

Status: This item is in accordance with the special rule designating the nonessential experimental population. The FWS has not received any reports of and is not aware of any incidents of such take.

*12. If and when recovery goals are met for downlisting the condor, a rule will be proposed and published in the Federal Register. A rule to downlist an endangered species to threatened would not affect the status of any experimental population.*

Status: Recovery goals for downlisting the condor have not been achieved.

*The Coalition of Counties and Local Governments agreed to:*

*1. Notify the FWS or other cooperators of any potential problems, issues, or concerns, and provide an opportunity for those issues to be resolved in an expedient manner in order to avoid conflicts.*

Status: As part of this review, the FWS requested information about potential problems, issues, and concerns with the reintroduction program. We have not received any such reports, either during preparation of this review or at other times. The comments received as part of this review are addressed in Appendix A.

*2. Notify the FWS or other Cooperators of any emergency situations regarding condor health and safety.*

Status: The FWS and other cooperators have not received reports of such situations.

*3. Work cooperatively with the FWS.*

Status: The FWS invites counties and local governments to participate in condor recovery activities, including ways that may improve economic benefits to the counties through their participation.

## **Public Support and Initiatives**

Numerous individuals and organizations outside of the list of official reintroduction program cooperators continue to provide invaluable support to the program. The SCWG again acknowledges and thanks the following individuals and organizations: Maggie Sacher, owner of Vermilion Cliffs Lodge, continues to provide a location for the TPF field base of operations. Her generous support of the program is punctuated by her consistent enthusiasm of the important role condor reintroduction can play in highlighting the human and natural resources of the cliff country she loves. On 14 January 2012, the Arizona Game and Fish Commission recognized Maggie as Arizona's 2011 Conservationist of the Year, largely due to her steadfast support of condor reintroduction efforts. Dr. Kathy Orr, DVM, and her associates at Liberty Wildlife and the Phoenix Zoo provided veterinary treatment of several lead-poisoned or otherwise injured condors throughout the duration of the program. Salt River Project has regularly responded to requests for helicopter flight support for the transport of condors and personnel. Arizona Public Service has designed, donated, and installed solar panels on the remote Vermilion Cliffs release site. Through the Arizona Heritage Fund, the people of Arizona have provided the resources needed to create and implement a successful hunter education program and equip condors with satellite transmitters. Numerous hunter organizations and ranchers have committed through the Condor Coalition to inform their members of ways to minimize the effects of lead ammunition on condors; their efforts are demonstrating that self-motivated sportsman's groups and ranchers continue their tradition of wildlife conservation.

The SCWG gratefully acknowledges the countless hours, rigorous field monitoring, thoughtful and science-based attention to data collection, and passionate dedication of TPF field staff. The continued financial support of TPF benefactors has enabled TPF to advance California condor conservation, through the breeding program at the World Center for Birds of Prey in Boise, Idaho, and through their field operations in Arizona and Utah. Again, members of the SCWG express admiration for the enduring accomplishments of William A. Burnham (1947-2006). We are indebted to Bill for his leadership of TPF and in the conservation community. The Southwest condor reintroduction program is but one aspect of Bill's legacy to the conservation of birds of prey and their habitats. His vision, dedication, and perseverance made the return of California condors to the Southwest possible.

Levels of public acceptance of the condor reintroduction appear to be uniformly supportive in this reporting period (2007-11). During initial years of the reintroduction program, while most commenters expressed enthusiastic support for the program, some individuals and entities in northern Arizona and south-central Utah vocally criticized and even litigated against the reintroduction program, expressly criticizing FWS intentions and lack of specific commitment to accommodating their concerns in the special 10(j) rule (Arizona Condor Review Team 2002). During the current review period, such objections to the program have been rare and, of the comments received for this report, there were few dissenting sentiments expressed. We can attribute this to continued and increased SCWG cooperation with broader groups of interested parties, continued interactions by TPF field staff and other working group members with local community members, and observations of opinion leaders in resource-based economies that the FWS and program are meeting their commitments under the 10(j) rule. Many public comments conveyed poignant and heartfelt experiences of condor viewings in the wild, how condor

viewing had enhanced a wilderness or tourism experience, or that the possibility of seeing condors had motivated individuals or groups to determine a travel destination. Individuals expressing objection to the reintroduction program specifically cited concern over property damage caused by condors, and concern regarding lead ammunition restrictions that might result from condor recovery efforts (see Lead Reduction Efforts and Economic Opportunities sections, and Appendix A).

While broad national, international, and local news and entertainment media coverage of the southwest condor reintroduction has waned since the initial releases of condors, unique and benchmark events in the program – such as egg laying and record fledging seasons – have generated flurries of broad interest. SCWG and its members have focused news releases and news media opportunities on such events. In an effort to provide the public with opportunities to be a part of or informed of the condor recovery program, the SCWG members produced and distributed the following news releases during the reporting period:

- Feb. 26, 2007 – Public release news release
- April 20, 2007 – Condor 5-year review news release
- July 19, 2007 – Chick hatches news release
- Nov. 14, 2007 – Condor non-lead progress news release
- July 29, 2008 – AGFD Commission confirms continued support for non-lead program news release
- Feb. 12, 2008 – Condor DVD announcement AGFD Wildlife News story (circulated to more than 14,000 constituents)
- March 4, 2008 – Public release news release
- Dec. 1, 2008 – Two chicks fledge news release
- Jan. 14, 2009 – Non-lead program participation news release
- Feb. 25, 2009 – Public release news release
- March 17, 2009 – Non-lead awareness in Page for varmint hunting news release
- May 28, 2009 – AGFD Commission enters lawsuit Center for Biological Diversity vs. BLM news release
- Jan. 22, 2010 – Public condor release news release
- Feb. 8, 2010 – Condor mortalities news release
- Sept. 25, 2010 – Public condor release news release
- April 27, 2011 – Condor nestling announcement news release
- May 31, 2011 – Condor mortalities news release
- Sept. 9, 2011 – Public condor news release
- Sept. 21, 2011 – Three condor chicks confirmed news release
- Nov. 10, 2011 – Update on three condor chicks news release
- Nov. 23, 2011 – Input sought in review of California condor program
- Dec. 15, 2011 – 15<sup>th</sup> Anniversary of condor reintroduction news release

TPF continues to provide news crew access to remote wilderness sites. TPF and AGFD have increased efforts to collect higher quality images readily make those photographic images available. Television news producers have requested that a more concerted effort be made to gather video images of such program events. Assessments of viewership/readership of condor

reintroduction news products and public attitudes (nationally or locally) have not been conducted.

News media coverage of annual condor releases at the Vermilion Cliffs in 2002-06 were sporadic and limited to coverage in the Salt Lake City, Phoenix, and Flagstaff media markets. However, the annual public condor releases (now conducted in September continues to draw 100-200 attendees. While the number of attendees is significantly less than that of the initial condor release, the opportunity to be a part of this aspect of the program is greatly appreciated and popular among local residents and regularly attracts destination visitors from Flagstaff, Kanab, and St. George and occasionally bird watchers from as far as California and Wisconsin. In 2011, a researcher/photographer from Holland came to Arizona for the primary purpose of viewing/photographing condors.

Throughout the year, travelers and bird watchers use the condor-release viewing facility in House Rock Valley. TPF uses the area for staging information meetings with interested groups. Improvements to the area have been made. The BLM completed construction of a new viewing area below the release site which will include parking, a new shelter, restroom, and fence around the site.

Staff at public land visitor centers within the reintroduced area report continued or increasing visitor interest in condor viewing. At BLM offices in St. George and Kanab, and at Glen Canyon National Recreation Area visitor centers, public interest is fairly high and employees in the visitor center respond to questions routinely. As a result of Grand Canyon NP staff requests, TPF and AGFD annually provide interpretive training at the North and South Rim.

Most SCWG members and personnel from working group agencies/organizations deliver presentations regarding the condor to service organizations, school groups, and visitor centers at varying frequency. TPF continues to provide presentations in communities throughout the range of the released condors and contributes greatly to the support and training of interpretive programs at public facilities throughout the range (and increasingly in the State of Utah as released condors expand into the state). Grand Canyon NP and AGFD increased and improved their outreach efforts in the 2007-2011 period.

### Arizona Initiatives

AGFD has continued public outreach efforts in the last five years. Outreach efforts have included condor presentations to general audiences as well as sportsman's groups, condor booths at wildlife and sportsman's fairs, and letters to big game hunters. During 2007-11, AGFD averaged approximately 39 condor presentations and eight condor education booths annually.

In 2007, AGFD produced an *Arizona Wildlife Views* TV Show segment titled "Condors First Flight" about new condors being released into the population.

AGFD published four *Arizona Wildlife Views* magazine articles:

- 2008 - "It Takes a Village" cooperative efforts of condor lead exposure issue
- 2009 - Two More California Condor Chicks Fly Free

- 2011 - 13th wild chick hatches in northern Arizona
- 2011 - Condor ER” condors/lead exposure issue and treatment

The AGFD-led effort to develop a hunter-education and non-lead-ammunition program to reduce lead exposure to condors is a substantial outreach effort and is described in full in the Lead-Reduction Efforts section of this report. This program in itself has been reported broadly in the news media (particularly California news markets) and has gained a tremendous amount of interest and support within sportsman, environmental, and land-management groups.

In the past five years, the SCWG and individuals interested in the condor reintroduction program have increasingly relied upon the internet to disseminate and receive condor program information. Web sites and pages that fill this need include:

- TPS - [www.peregrinefund.org/released\\_condorsinfo.asp](http://www.peregrinefund.org/released_condorsinfo.asp)
- FWS - [www.fws.gov/southwest/es/arizona/CA\\_Condor.htm](http://www.fws.gov/southwest/es/arizona/CA_Condor.htm) and <http://www.fws.gov/hoppermountain/CACORecoveryProgram/CACondorRecoveryProgram.html>
- BLM - [www.blm.gov/az/asfo/wildlife/condor.htm](http://www.blm.gov/az/asfo/wildlife/condor.htm)
- AGFD - [www.azgfd.gov/condor](http://www.azgfd.gov/condor)
- Grand Canyon NP - <http://www.nps.gov/grca/naturescience/california-condors.htm>
- UDWR - <http://wildlife.utah.gov/condors/>

TPF’s increasingly popular condor Facebook page (<http://www.facebook.com/CondorCliffs>) has become a preferred venue for releasing current condor field information to the public.

### Grand Canyon National Park Initiatives

Grand Canyon NP has continued to focus on communication of the reintroduction program to diverse audiences. In addition to the regularly scheduled formal condor programs advertized in the park newspaper and offered on the North and South Rims of the Grand Canyon, several other interpretive efforts have enabled contacts with audiences that would not be reached by traditional methods.

A total of 1,214 daily condor programs plus 114 illustrated formal evening programs were offered at Grand Canyon NP from March 2007 through November 2011 reaching 63,299 documented contacts. The Environmental Education branch of the Division of Interpretation also presented approximately 150 curriculum based educational programs and more than 250 educational outreach Ranger Visits to Classrooms. These outreach programs, in addition to 35 outreach presentations for Elderhostel, Audubon societies, outdoor organizations and the National Association of Interpretation workshop used photographs donated by condor reintroduction team members and local professionals to reach audiences of 20 to 30 people per group who may be unable to have the opportunity to experience seeing the condors in person. All of these presentations focus on the current successes and challenges of the reintroduction program and include a strong condor resource preservation message as well as a concerted effort to acknowledge the partnership between various organizations that constitute the overall reintroduction team. Issues such as the use of non-lead ammunition, breeding success, and other

human-caused environmental issues inspire extensive post-program conversations with audience members who often demonstrate great acceptance and awareness of these subjects. These in-depth conversations after the formal presentations clearly indicate to the presenters that the information is not only being received, but also being passed on to a wider audience. A common statement by visitors is that they plan to talk to a family member back home about using non-lead ammunition.

Informal interpretative contacts are an additional integral element of telling the story of California condors at Grand Canyon NP. Park rangers conduct roving interpretation to people present along the South Rim, especially during periods of condor activity. This may involve setting up a spotting scope to show a perched condor or simply pointing them out in flight. Roving contacts may also answer questions regarding potential condor viewing locations or explain identification techniques when visitors have seen a different bird and want to know how to tell if it is a condor. Although such contacts are not as in-depth as formal interpretive programs, rangers are trained to know how to move a contact that is simply informational towards one that is more interpretive with a resource message. These roving contacts, combined with short impromptu talks, reached 258,144 documented contacts over the five year period - many of which received at least some element of condor information.

Grand Canyon NP's Environmental Education branch also documented over 20,000 informal contacts at the "Kids Table" that includes pictures of the California condor, skull, and egg that are used daily in informal contacts, short presentations, and during condor sightings on the South Rim.

The Science and Resource Management, Wildlife Program at Grand Canyon NP conducts a highly successful, volunteer-based California condor monitoring program. Volunteers with avian training and biological backgrounds conduct radio telemetry and visual scans for condors along the South Rim, as well as nest monitoring. Since the inception of the program in 2009, 29 condor volunteers performed 3,349 hours of service. Between 2009 and 2011, 11,433 visitor contacts were recorded (above and beyond the above tallies for interpretive ranger contacts). During these interactions, volunteers provided visitors with information on condor biology, behavior, the recovery program, and lead reduction messages. Volunteers assisted visitors with the identification of condors and other avian species and provided interpretive material.

Recently, Grand Canyon NP has introduced a new media venue for park visitors. The new movie at the visitor center entitled "Grand Canyon: A Journey of Wonder" is shown every half hour at the Grand Canyon Visitor Center and is the official "park movie". One of the five emphasis pieces in the film was developed in concert with TPF, AGFD, and other reintroduction team members and presents condor-related information to audiences that may never see an interpretive ranger. Although the park has yet to tally movie-goer numbers, it is expected to be viewed by a large portion of the millions of visitors who spend time at the park's South Rim. Additional exhibits for the visitor center are under construction and will be installed in early 2012. Although we do not know how many people will experience these exhibits, the extensive presence of condor information at Grand Canyon NP clearly reaches the vast majority of our visitation.

Although it is one of the primary interpretive themes and focus of considerable effort by multiple divisions, Grand Canyon NP staff has not limited condor education to interpretive services within the park. With the involvement of several members of both the Interpretive and Science and Resource Management Divisions at the annual SCWG meetings, interpreters and biologists recognize a greater need for outreach and education. Working with multiple agencies, parks, and facilities, the two staff teams sponsored the first Condor Outreach Workshop at the Horace M. Albright Training Center in 2009. This workshop involved inviting people from several other parks and locations involved with condor reintroduction to a multi-day event focused on providing accurate, effective, and coordinated messages. Programs discussing California condor recovery across its range in California, Arizona, and Utah, lead reduction efforts, and the physiology of lead in vertebrate systems were presented. These programs discussing education, outreach, and interpretive techniques encouraged biologists and educators to work together to achieve a common language when speaking to the public about the California condor. The park plans to continue sponsorship of such workshops at least once every five years.

The team effort by Grand Canyon NP to work with and represent the condor reintroduction program reaches a large numbers of visitors from diverse audiences with potentially far ranging effects well beyond the local area.

### Utah Initiatives

Educational efforts by UDWR included various presentations to local organizations and school groups, radio and newspaper interviews and programs, and creation of a YouTube video. No specific accounting of the numbers and types of programs was kept. The most significant and effective UDWR outreach effort was establishment of a “Day of the Condor” wildlife viewing event. This event, held near Kolob Reservoir, began in 2008 and occurs annually the third Saturday in June. It was organized and sponsored by UDWR with assistance from TPF and Zion NP. Members of the public were invited to come to the site to see and learn about condors. Attendance at this event has been between 100 and 250 people each year. Condor attendance is not dependable, but as many as 20 birds have been seen at very close range. People who did not get to see condors were disappointed, but they often stayed for more than an hour discussing and listening to discussions about condors (and related local programs). UDWR also conducted in-house educational programs for biological, enforcement and clerical staff. Finally, UDWR established a condor web page (<http://wildlife.utah.gov/condors/>) within its home web site (<http://wildlife.utah.gov/dwr/>). This web page provides information about the condor recovery program in Utah and Arizona, general information about condors, and links to TPF, AGFD, and other pertinent web sites.

Zion NP also expended considerable effort to inform and educate the public about condors. Beginning in 2008, this effort increased over time as condor use of the park increased. Zion NP interpretive rangers included discussions of condors during regularly scheduled programs on park birds and obtained condor feathers and an artificial egg to facilitate these presentations. In 2011, Zion NP initiated a full evening program on condors. Both Zion NP and UDWR presented condor conservation messages at the annual Zion Canyon Earth Day festival held each spring in Springdale, Utah. Zion NP personnel also designed and produced a life-sized condor banner that is now used by Ventana Wildlife Society, Pinnacles National Monument, and Grand Canyon NP,

as well as at Zion NP, for educational outreach programs. In conjunction with Institute for Wildlife Studies and Pinnacles NM, Zion NP personnel were instrumental in organizing the two non-lead ammunition shooting events held in August 2011. Problems of condor interaction with visitors have been addressed through a condor hazing program and the use of trained volunteers to educate visitors on the dangers of feeding/interacting with condors. Lastly, Zion NP purchased a radio telemetry receiver in 2009 and now regularly tracks condor movements in the park.

Federal agencies in southern Utah also assisted in the dissemination of condor-related information. Ranger District offices of the Dixie and Fishlake National Forests, Cedar City and Kanab BLM field offices and Grand Staircase-Escalante National Monument offices all maintained supplies of educational resources and distributed these to interested visitors. They discussed condor management and issues in outreach programs when possible.

### **Economic Opportunities**

A systematic review of the economic effects of the condor reintroduction or economic opportunities has not been conducted. Most businesses in the immediate proximity of the condor release area are heavily reliant on outdoor recreation and tourism (e.g., Grand Canyon viewing, hiking, river running and trout angling, and supporting lodging, dining, and guide services). Local business owners and public lands managers continue to note that condor presence in the area provides “value added” to the selection of this area as a visitor destination. Most visitors do not schedule trips for the sole purpose of seeing condors, although some businesses have reported that clients extend their stay in the area to include a condor viewing experience. In previous reviews, Grand Canyon NP reported that only a small number of visitors come to the park to view condors, yet upon arrival the majority of surveyed visitors stated that condor viewing was the most memorable feature of their visit. During this reporting period, a greater number of Grand Canyon NP visitors claimed that condor viewing is an increasingly important element or primary destination of their travel planning. Destination and extended visits and side trips to areas for condor viewing undoubtedly result in increased spending in the area. Condor-viewing destination travel (particularly resulting from attendees at condor releases and among bird watchers in pursuit of untagged condors, such as recently fledged birds at Grand Canyon) created an economic stimulus that is solely attributable to the condor program. However, the number of increased visitors is unknown, and their length of stay and expenditures has not been ascertained. Similarly, as the range of the introduced condors expands to additional tourist destinations, visitor spending is likely to increase.

Marketing condors as a visitor destination feature is not within the current scope of the SCWG. However, the group recognizes the potential for such commercial and regional interest in such efforts and is prepared to consider the effects to the program and how the program could prudently accommodate such interest. This has been demonstrated during this reporting period through the increased condor presence and accommodation of condor viewing at national parks.

Condor field crews and SCWG members also contribute to local economies through fuel, grocery, meal, and occasional lodging purchases. Roughly, half of TPF’s total condor budget is expended on field operations. Thus, \$616,625 annually (a total of \$3,093,127 for the reporting period) was spent by TPF alone in the rural Arizona and Utah communities within the condors’

range. As the condors' range and the amount of time they spend in southern Utah have increased, so has the economic distribution and contribution of field crews in Utah.

Land-use restrictions have not been imposed due to the nonessential experimental population designation, and resulting economic costs to local economies have not been realized and are not anticipated. Some people are concerned that regulated limitations of the use of lead ammunition resulting from the reintroduction program may result in increased costs to hunters.

However, as the condor population has grown and many condors have spent longer periods of the year in southern Utah, private property owners on Kanarra Mountain have reported over \$10,000 of condor damage to their properties. Condors have perched on rooftops, damaged vehicles, and even entered one residence. The property owners have been generally supportive of the condor reestablishment program, but are frustrated that they cannot always be present to protect their property. TPF has field personnel present in the area regularly to track condor movements and haze birds from buildings, etc. when necessary. However, condors will sometimes cause damage to homes and possessions when no permitted field personnel are available to haze them or property owners are absent.

FWS, TPF, and UDWR responded to these complaints as they were received. Because there are no programs available to provide reimbursement for these damages, TPF provided training to property owners so they can haze birds from their property. Training on proper response was offered to property owners to ensure that no condors would be injured when TPF, state, or federal personnel were not immediately available. Contact information for local permitted agency personnel was also made available so that property owners could obtain assistance in hazing condors when needed. When contacted, TPF and UDWR personnel hazed condors from properties and in some cases provided aversive conditioning devices (e. g. Nixalite® bird spikes) to the affected property owners in order to curb undesirable condor behavior. Personnel from TPF, UDWR, and FWS are available to respond to any continuing complaints (see Participating Agencies and Organizations section for contact information).

## **Law Enforcement**

Clarification regarding jurisdictions and responsibilities of the major land-management agencies involved in the reintroduction process was included in this section in the first five-year review. Please see that report for the information. The second five-year review included a summary of the development of procedures and protocols for handling condor mortalities. As that summary concluded, the SCWG believes any law enforcement issues have been sufficiently addressed.

At the beginning of the reporting period (2007-11), two California condor law enforcement cases were still unsolved. Two condors were found dead in northern Arizona in September 2002. Examination results from the FWS National Fish and Wildlife Forensics Laboratory confirmed that Condor 258 died as a result of being shot with a shotgun and that Condor 186 died after being shot with an arrow. The statute of limitations subsequently expired and both cases were closed in 2007. No other law enforcement issues were reported for the review period.

## Aviation

The second five-year review included a summary of situations and issues regarding aviation that are relevant to the condor reintroduction program. Please see that review for this information. There have been no aviation accidents or incidents reported since reintroductions began.

Grand Canyon NP continues to implement mitigation actions to avoid disturbance to birds. As an example, two NPS helicopter flight pattern diversions were requested in 2011 due to active nest areas in the Pipe Springs drainage and the Battleship formation. The NPS Helibase was provided with geographic location information, and flight paths were diverted for protection of the nesting condors. Helicopters maintained a buffer of 1.6 km/1 mi from the active nest areas. NPS Helibase was fully cooperative with the requests from the Grand Canyon NP Wildlife Program and briefed pilots before all flights.

In November 2009, FWS and Grand Canyon NP concluded formal section 7 consultation on the park's updated fire management plan. As part of this consultation, Grand Canyon NP included a number of conservation measures to minimize potential effects to condors from fire management activities, including several measures to avoid impacts from aircraft use during fire suppression and management.

In February 2011, NPS issued the Draft EIS "Special Flight Rules in the Vicinity of Grand Canyon National Park / Actions to Substantially Restore Natural Quiet". The proposed action would modify flight rules in the vicinity of the Grand Canyon to protect resources and substantially restore natural quiet. Some aviation corridors would be modified along with altitudes and route adjustments. The number of daily flights and allowable operation times would also be changed. Depending on the final decision, proposed changes may reduce noise impacts and disturbance to condor breeding activity in some areas of the park.

Mitigation measures commonly used within Grand Canyon NP for NPS projects that employ aviation services include:

- A Resource Advisor will be present at all wildland fires that involve aircraft support.
- All water dip tanks are covered when not in use.
- All fire personnel are provided literature or instruction regarding condor concerns.
- Any condor presence in the project area is recorded and reported immediately to the Resource Advisor or a Grand Canyon NP wildlife biologist.
- Condors that arrive at any area of human activity associated the project are avoided. The Resource Advisor or a Grand Canyon NP wildlife biologist is notified and only permitted personnel will haze the birds from the area.
- Fire-retardant chemical application areas are surveyed to the extent possible in order to remove any contaminated carcasses before they become condor food sources.
- Aircraft use is minimized along the rim to the greatest extent possible.
- Aircraft are kept at least 1,200 feet (400 meters) from condors in the air or on the ground unless safety concerns override this restriction. This restriction does not apply to the North Rim helispot.

- If airborne condors approach aircraft, aircraft will give up airspace to the extent possible, as long as this action does not jeopardize safety.

Recommendations from previous reviews include:

- Advise the Air Force of condor release sites and concentration sites, in order to have these locations marked as hazards on military training route maps (specifically the Department of Defense flight planning publication AP/1B that is published twice annually).
- A review with air tour operators should be conducted on an annual basis to ensure compliance with the Airborne Hunting Statute and potential violation of the ESA.
- All condor field personnel should report all potential condor/aviation incidents and be trained to record aircraft identification numbers, as well as be knowledgeable of wilderness or special land management aviation guidelines and other pertinent information.

### **USDA APHIS-Wildlife Services Activities**

The second five-year review included a description of USDA's APHIS-Wildlife Services responsibilities and activities regarding predation management within the 10(j) area. Please see that review for this information.

Wildlife Services has the statutory authority to manage and prevent wildlife damage, including predation management to protect livestock. Recognizing that Wildlife Services will continue to conduct predation management in the condor reintroduction area, and that good communications between the Wildlife Services and the condor reintroduction program is essential, we recommend that Wildlife Services be invited to become a condor program cooperator and party to any revised MOU.

Wildlife Services in Utah has taken steps to decrease potential for lead exposure in southern Utah by using steel shot and non-lead center-fire ammunition in the Cedar Mountain/Kolob Plateau area frequented by condors. Wildlife Services within the condor range in Arizona also uses non-lead ammunition.

UDWR policies have also been altered to require use of non-lead ammunition for hazing and removal of nuisance and depredation animals.

### **Expansion of the Nonessential Experimental Population Area**

When the final 10(j) rule was published in the *Federal Register* in October 1996 (USFWS 1996a), most specialists believed that the designated area would be large enough to adequately contain the condor population. However, the discussion of issues within the *Federal Register* final rule (Issue and Response 14; USFWS 1996a, p. 54055) acknowledged that should the designated area prove inadequate, FWS has the option to revise the rule to increase the size or change the configuration of the area.

By July 1998, condors were confirmed outside the current 10(j) area, and since that time there have been other instances to the north, east, west and south of the 10(j) area (Figure 2). Initially, these flights appeared to be experimentation by new birds, and the longest travels still fit into that category with birds either returning or being lost. However, a significant increase in condor use has occurred in the Kolob and Cedar City areas of Utah (Figure 3), and individuals are exploring nest caves on the west flank of the Kolob range near and within Kolob Canyon in addition to the canyon region southeast of Zion NP.

In 2006, the SCWG approached the Western Association of Fish and Wildlife Agencies regarding expanding the 10(j) area, and coordinated with the states of Utah, Arizona, New Mexico, Colorado, Wyoming and Nevada, and the Navajo Nation. The SCWG formally submitted a concept expansion proposal to both the California Condor Recovery Team and the FWS Arizona Ecological Services Field Supervisor in September 2006. Due to a lack of FWS funding and a lack of urgent need to expand the area beyond its current boundary in Utah and other states, no further work has been done on this effort since 2006.

During this reporting period, very few condors extended their travels beyond the 10(j) boundary. This may be due to the fact that introduced condors today are influenced by the habits of the existing population. Unless significant changes in use patterns by condors occur, the cooperators do not propose pursuing any changes to the current 10(j) area boundary.

### **Cooperator Project Costs**

Partners of the condor reintroduction program were asked to provide information regarding funds or other in-kind goods or services that were expended on the program during the review period (2007-11). Responses that were received are summarized below.

TPF reported spending \$6,186,255 during the reporting period on propagation and release efforts for the southwest reintroduction effort. That sum is an increase of \$22,426 over the \$6,163,829 expended (2001-2006) during the previous reporting period. During the reporting period, TPF received \$2,395,954 from congressional appropriations through the FWS for the overall condor recovery program, \$150,000 from the BLM, \$100,000 from the National Fish and Wildlife Foundation in FY 07, \$15,000 from AGFD, \$13,800 from UDWR in FY 09, and \$10,000 from the Kaibab NF in FY10. The remainder of the funding came from private donations solicited by TPF. Annual expenditures were as follows:

2007	\$1,337,139
2008	\$1,406,411
2009	\$1,293,861
2010	\$1,044,664
2011	\$1,104,180

During the five-year reporting period, AGFD employed one full time condor biologist and dedicated additional resources towards condor management as well as a public education program. Additional AGFD funds were allocated to voluntary lead reduction efforts each year,

including the free non-lead ammunition program. The AGFD budget for the last five fiscal years (July-June) was as follows:

2007	Condor program operating costs: \$85,100
	Free non-lead ammunition program costs: \$83,300
	<u>FY 2007 Total Expenditures: \$168,400</u>
2008	Condor program operating costs: \$96,000
	Free non-lead ammunition program costs: \$113,200
	<u>FY 2008 Total Expenditures: \$209,200</u>
2009	Condor program operating costs: \$96,100
	Free non-lead ammunition program costs: \$130,100
	<u>FY 2009 Total Expenditures: \$226,200</u>
2010	Condor program operating costs: \$78,500
	Free non-lead ammunition program costs: \$85,200
	<u>FY 2010 Total Expenditures: \$163,700</u>
2011	Condor program operating costs: \$78,300
	Free non-lead ammunition program costs: \$78,600 (including \$3,500 grant from BLM)
	<u>FY 2011 Total Expenditures: \$156,900</u>

UDWR expenses for the current review period are estimated at \$65,000. Actual expenses were likely higher, but the UDWR's budgeting system did not provide for tracking all condor-related expenses until state fiscal year 2010. These expenses included: support of biological and outreach staff (about \$39,000); a grant to TPF for purchase of GPS transmitters (\$13,800); reimbursing hunters for purchase of non-lead ammunition (\$4,225); and travel, publication of educational information, and other miscellaneous expenses (\$8,200).

A new wildlife conservation foundation was established in Utah during the reporting period. Utah Wildlife in Need (UWIN) is a private organization that was established to raise funds that could be used to support special projects that UDWR could not otherwise fund. The Southwest condor recovery program was one of three programs embraced by UWIN as flagship programs. Contributions to UWIN were below expectations because of economic conditions following the 2008 banking/housing collapse. As a result, UWIN was only able to provide advertising and branding support to condor recovery. The organization still maintains involvement and intends to contribute to non-lead ammunition initiatives as funding becomes available.

In addition to congressional appropriations to TPF, FWS offices in Arizona and California provided approximately 0.3 FTE each year for condor recovery efforts from 2007 through 2011 at an annual cost of approximately \$25,000. That total represents condor-related activity including participation in the SCWG, recovery actions, management and administration, and outreach. The FWS Utah Ecological Services Office has been unable to provide support to the program.

For the past five years, the Grand Canyon NP Science and Resource Management Wildlife Program budgeted \$310,425 for condor-related expenses, which included one to three condor

biologists and technicians, operating costs, and volunteer-based condor monitoring program costs.

Zion NP did not maintain specific records of expenditures related to condor presence in the park. However, park personnel estimate expenses were \$4,000 in federal fiscal year 2009, \$5,000 in 2010 and \$10,000 in 2011.

The BLM-Arizona Strip District Office budgets approximately \$6,000 per year for transportation of condors. This is typically used to bring condors from the breeding facility in Boise to the release site. BLM has also organized vehicles and personnel to get the condors from the viewing area to the release pens. The BLM contributed \$20,000 in 2008, \$40,000 in 2009, \$40,000 in 2010, and \$50,000 in 2011 to TPF for condor recovery. BLM staff time budgeted for condor work was equivalent to \$11,520 in fiscal year 2007, \$11,221 in 2008, \$26,296 in 2010, and \$17,552 in 2011.

The Kaibab NF reported an expenditure of \$5,100 per year on meetings, consultations, and outreach with the public and USFS personnel.

### **Accomplishment of Recovery Tasks**

The recovery strategy for the California condor is to focus on: 1) increasing reproduction in captivity to provide condors for release; 2) releasing condors to the wild; 3) minimizing condor mortality factors; 4) maintaining habitat for condor recovery; and 5) implementing condor information and education programs (U.S. Fish and Wildlife Service 1996b). The reintroduction of California condors in the Southwest has contributed to the accomplishment of recovery strategy items 2, 3, 4, and 5 above.

#### *Recovery Outline*

The recovery outline of the recovery plan includes several tasks to be completed or implemented. The following tasks have been initiated and are ongoing efforts in the reintroduction program in the Southwest.

#### *2. Reintroduce California Condors to the Wild*

##### *24. Following the procedures outlined in tasks 21 through 23, implement releases of California condors outside California.*

##### *241. Release California condors in northern Arizona.*

Status of Task 241: Release of condors in the Southwest (northern Arizona) began in December 1996. As of the end of 2011, a total of 134 condors were released in Arizona via 41 separate releases. See the Biology and Management section.

3. *Provide Habitat for Condor Recovery in the Wild.*
  31. *Continue to implement management plans to protect known suitable nesting sites on public lands.*
  32. *Continue to implement management plans to protect known suitable roosting sites on public lands.*
  33. *Provide foraging habitat.*

Status of Tasks 31, 32, and 33: In 2008, the BLM completed a revised resource management plan for the Arizona Strip District lands that included a general goal to maintain foraging habitat for condors.

34. *Continue to monitor potential impacts of all surface-disturbing activities (e.g., energy, residential, agricultural, and transportation development projects) within historical condor range.*

Status of Task 34: Federal land management agencies that administer lands and activities within the 10(j) area incorporate voluntary conservation measures into project activities in order to minimize potential disturbances and hazards to condors during these actions.

4. *Minimize Mortality Factors in the Natural Environment.*
  43. *Implement management recommendations and strategies to minimize contaminant-related mortality factors.*

Status of Task 43: A voluntary non-lead ammunition program for big-game hunters in condor range was initiated in Arizona in 2003 and in Utah in 2010. The programs provide non-lead ammunition (Arizona) or rebates on the purchase of non-lead ammunition (Utah) to hunters who are successful in obtaining hunting tags and who wish to participate. See the Lead Reduction Efforts section.

44. *Eliminate or reduce the effects of environmental contaminants on California condor.*

Status of Task 44: The voluntary lead-ammunition program has probably reduced the effects of lead contamination on condors to some extent for condors that may be exposed to lead ammunition. See the Biology and Management and Lead Reduction Efforts sections.

45. *Monitor contaminant levels in California condors.*

Status of Task 45: Most condors are captured and monitored to detect and determine levels of lead contamination a few times a year. Condors that demonstrate high blood-levels are removed from the wild and treated to reduce the lead contamination. See the Biology and Management section.

5. *Implement information and education programs on condor habitat use and protection needs.*

51. *Distribute educational material about condor habitat, species identification, and legal protection.*

Status of Task 51: Pamphlets and other educational materials regarding such condor information have been produced by program cooperators. Program cooperators regularly distribute those materials and conduct interpretative programs at several of their nodes of public contact in condor country. See the Administration section.

54. *Establish observation points and educational facilities at selected sites.*

Status: of 54: Public observation of condors and interpretation of the observations by the NPS occur regularly on the South Rim of Grand Canyon NP. An interpretative facility for public observation of condors was constructed at the base of the Vermilion Cliffs on the BLM Arizona Strip District. UDWR initiated a “Day of the Condor” wildlife viewing program near Kolob Reservoir in 2008. See the Administration section.

### Recovery Criteria

Attaining a successful reintroduced population of California condors is essential to meet recovery plan objectives for the species. The minimum criteria for reclassification of the California condor to threatened is maintenance of at least two non-captive populations and one captive population. These populations: (1) must each number at least 150 individuals, (2) must each contain at least 15 breeding pairs, and (3) be reproductively self-sustaining and have a positive rate of population growth. In addition, the non-captive populations (4) must be spatially distinct and non-interacting, and (5) must contain individuals descended from each of the 14 founders.

The condor reintroduction program in the Southwest is part of the effort to attain the minimum criteria goals. By the end of 2011, the southwest condor population had grown to 73 individuals with six breeding pairs. The population has a positive rate of population growth, but this level of growth is sustained by release of captive-bred birds. The population is not reproductively self-sustaining. The southwest population is spatially distinct and non-interacting with the other wild populations in California and Baja California. Individuals released into the southwest population have been descendants of the original 14 founders; however, analysis of genetic representation in the extant population has not been conducted.

## **RESEARCH AND MANAGEMENT ACTIONS**

### **Research Needs and Actions**

Research needs were identified in the previous (second) five-year review. Table 8 is a summary of how the research needs identified in the second five-year review were addressed during the

third five-year period. Research recommendations for the next five years have been included in the Recommendations section, below.

*Table 8. Summary of recommendations for research from the second five-year review and accomplishments in the third five-year period.*

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
Develop methods for assessing the lead-exposure history of individual condors.	Ongoing: Annual lead testing using existing methods continued during this reporting period – therefore the history of individual birds is being collected.	Biology and Management
Evaluate lead loads in carcasses available to condors.	Ongoing: Carcasses and animal remains associated with condor foraging are located in the field and are opportunistically collected and radiographed.	Biology and Management
Analyze the relationships between movements and lead levels with particular emphasis on the increasing use by condors of the Kolob/Zion region of southern Utah.	Completed and ongoing: Parish <i>et al.</i> (2009), Hunt <i>et al.</i> (2009a, 2009b), Green <i>et al.</i> (2009) papers. Continuing to collect location and lead exposure data for future analysis.	Appendix F
Monitor condor locations relative to carcass distribution.	Ongoing: Continuing to monitor condor foraging locations and available food sources.	Biology and Management
Investigate factors influencing condor nest success.	Ongoing: Reproductive success continues to be monitored.	Biology and Management, Pending publication
Monitor and evaluate condor behavior and management methods aimed at improving errant behavior.	Ongoing: Continuing to address coyote predation issues and private property damage issues.	Biology and Management
Monitor and evaluate relationships between lead fragments and blood lead levels found in condors.	Completed: Lead isotope study by University of Arizona matched lead fragments to condor blood lead. Also consistent with lead ammunition sources.	Appendix F
Determine the long-term implication of repeated lead exposure to, and the impacts of multiple chelation treatments on, condors.	Ongoing: Condor lead exposure, reproduction, and behavior data is continually collected for future analysis. To date, insufficient data exists for statistical analysis.	Biology and Management

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
Continue to investigate the occurrence and effects of other contaminants that condors may be exposed to.	Discontinued: No other contaminants were identified during this reporting period. If evidence suggests further investigation is needed, SCWG will pursue.	N/A
Model the demography of the population with recent data.	Ongoing: TPF continues to collect data for analysis.	Biology and Management, Publication planned
Analyze feather lead isotopes to see if time of lead exposure can be determined.	Ongoing: One paper published. Samples continue to be collected and future analysis is planned pending funding.	Recommendations
Evaluate fragmentation characteristics of additional bullet types (e.g. bonded bullets).	Ongoing: TPF and AGFD staff continue to use ballistics gelatin and water jug tests to analyze fragmentation rates of hunting bullets, including lead bonded bullets and varmint bullets, as well as new non-lead bullets.	Lead Reduction Efforts, Appendix C
Conduct follow-up surveys of hunters to determine the efficacy of outreach efforts.	Ongoing: In 2008, AGFD surveyed hunters in areas around the release site to determine how many took lead reduction actions. Surveys of Kaibab hunters are also conducted annually at the Jacob lake check station. Informal surveys of hunters in the field and at sportsman's expos are also conducted annually. 2011 Unit 9 and 10 hunters will also be surveyed in 2012 to determine the efficacy of outreach efforts. Results will be reported in the next 5-year condor program review.	Lead Reduction Efforts, Appendix E
Determine how to engage varmint hunters in lead-reduction efforts.	Ongoing: AGFD and TPF met with varmint hunting groups to discuss their involvement in voluntary lead reduction efforts during this reporting period. In 2008, AGFD also conducted surveys of hunters in areas around the condor release site to determine how many varmint and small game hunters took lead reduction efforts. AGFD also added x-rays of coyote carcasses containing lead ammo fragments in their outreach material, including their spring hunting regulations booklet.	Lead Reduction Efforts, Appendix E

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
Evaluate the toxicity of bismuth and copper varmint-caliber bullets.	Not completed: SCWG did not consider this a priority during this reporting period since there was no evidence indicating a toxicity problem from bismuth or copper existed in condors.	N/A

## **Management Actions**

The second five-year review included several recommendations for administration, coordination, and field management. Table 9 summarizes the implementation of those recommendations and includes references to where the relevant information can be found in this document. Management recommendations for the next five years have been included in the Recommendations section, below.

*Table 9. Summary of administration, coordination, and field management recommendations from the second five-year review, and accomplishments in the third five-year period.*

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
Broaden outreach efforts to more effectively address ongoing issues with lead shot, bullets from varmint hunters, and non-participation in the free non-lead ammunition program. The effort will include additional outreach to Utah, hunting guides, Native American Nations, and others. The effort will include strategic use of media in outreach efforts.	Ongoing: Participation in the free ammo program/gut pile raffle was increased to between 80% and 90% during this reporting period. All outreach in Arizona was expanded to include varmint and small game hunters. Lead reduction presentations were also given to multiple Arizona varmint caller groups. Outreach efforts were expanded within Native American Nations via regular updates at coordination meetings with the Hopi, Navajo, and Kaibab Paiute tribes; condor/non-lead ammo booths at Hopi and Navajo expos; non-lead ammo info provided during Hopi hunter education classes; and outreach letters mailed to Navajo hunters. Hunting guides on the Kaibab Plateau were asked to request their clients use non-lead ammunition on their permit issued by the Forest Service. Multiple press releases and media stories generated by SWCG focused on lead reduction efforts and the lead	Lead Reduction Efforts, Appendix E

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
	<p>reduction message was added to all condor program press releases during this reporting period.</p> <p>UDWR began a voluntary non-lead ammunition program. Outreach efforts include television and radio interviews, public events, hunter contacts, non-lead ammunition shoots, and a condor viewing day.</p>	
<p>Expand the Condor Coalition by recruiting influential national and local sportsman's groups.</p>	<p>Ongoing: Condor Coalition members names continued to be used in outreach to hunters and lead reduction articles were printed in Arizona coalition members' publications during this reporting period. Although lead reduction presentations were given to Arizona varmint calling groups and several Utah sportsman's groups during this reporting period, no additional local hunting groups or national sportsman's groups officially joined the coalition.</p>	<p>Lead Reduction Efforts, Appendix E</p>
<p>Continue publishing and sharing results from the free non-lead ammunition program with the public including results from the University of Arizona lead isotope study.</p>	<p>Ongoing: Results from Arizona's free non-lead ammunition program have been provided to the public via AGFD's website, hunting regulations, press releases, public presentations, brochures, and expos. Results from the University of Arizona lead isotope study were presented at a 2008 conference in Boise, Idaho.</p>	<p>Lead Reduction Efforts, Appendix E</p>
<p>Assess whether the voluntary lead-reduction efforts are effective in reducing the amount of lead available to condors.</p>	<p>Ongoing: Condor trapping and lead testing continued during this reporting period. Lead exposure levels, treatment, and lead mortalities also continued to be tracked annually. Since condor movements have shifted significantly into southern Utah during the fall hunting season, it is difficult to assess whether voluntary lead reduction efforts in Arizona have been effective in reducing condor lead exposure. A modeling study by Green <i>et al.</i> 2009 indicated that Arizona's</p>	<p>Biology and Management, Lead Reduction Efforts, Appendix B</p>

<b>Recommendation</b>	<b>Action</b>	<b>Reference In This Document</b>
	voluntary lead reduction efforts have significantly reduced the amount of lead available to condors.	
Consider monthly condor reports for distributing information to the North Rim, Kaibab Lodge, Jacob Lake visitor center, and other venues to assist with information demands of staff, interpreters, and visitors.	Ongoing: Monthly condor reports were provided to interested parties by the AGFD during the first year of this reporting period, as lead reduction workload demands increased, these updates were reduced to quarterly reports by AGFD. By 2009, NPS interpretive staff started providing regular condor reports to interested parties. By the fall of 2010, TPF created a Facebook page called Condor Cliffs which supplied consistent condor program updates to the public.	Administration
Expand interpretative training for NPS to include staff on the North Rim.	Ongoing: Annual interpretive training was expanded to include staff from the North Rim of the Grand Canyon during this reporting period. TPF and AGFD staff provided annual training to both Grand Canyon NP North Rim and South Rim staff as well as Zion NP staff. Grand Canyon NP staff also conducted internal training for backcountry and river guides as well as shuttle bus drivers.	Lead Reduction Efforts, Administration, Appendix E
Consider a module on condors in the Focus Wild Arizona curriculum, perhaps with satellite telemetry data.	Not completed: A module on condors was not added to the Focus Wild Arizona curriculum during this reporting period, but AGFD is planning to develop one in 2012.	N/A
Assist the southern Utah NPS units with development of outreach materials for visitors.	Ongoing: TPF, AGFD, UDWR, and Grand Canyon NP have all assisted Zion and Bryce Canyon NPs with interpretive training and the development of outreach materials for visitors. Several information pamphlets produced by Several information pamphlets produced by AGFD and UDWR were distributed to Zion and Bryce Canyon NPs. Grand Canyon NP also hosted a	Lead Reduction Efforts, Administration

Recommendation	Action	Reference In This Document
	condor program outreach workshop that Utah NPS units were invited to attend. Several information pamphlets produced by UDWR and AGFD were distributed to Zion and Bryce Canyon NPs.	
Add Wildlife Services in Arizona and Utah to the SCWG mailing list so they are invited to future meetings and receive updates.	Not completed: Wildlife Services will be added to distribution list for future SCWG meetings and condor program updates.	Recommendations
USFWS Clarify conservation measures for land-management practices.	Ongoing: FWS will work with land management agencies to develop a comprehensive list of conservation measures from existing lists.	Recommendations
Continue the effort to expand the 10(j) area.	SCWG pursued this extensively and initially recommended expansion; however funding issues hindered the effort. No indications from current bird movements indicate this should become a priority, considering the funding and resources required to complete this task, and the effort has been discontinued.	N/A

## RECOMMENDATIONS

This five-year review has discussed the status of and factors affecting the Southwest condor recovery program and discloses the causes and circumstances of condor mortalities and the resulting management actions. This report concludes that lead contamination is the major factor hindering the success of the program. If the program is to succeed in the establishment of a self-sustaining population of condors, the sources and effects of lead contamination must be reduced or eliminated.

### Management Options

The SCWG considered the following management options for the future of the Southwest program:

1. *Promote state and federal agency regulations on the use of non-lead bullets and shot in the range of the condor in Arizona and Utah.*

Recommendation: The SCWG does not recommend a lead ammunition ban. The final rule that established the nonessential experimental condor population in Arizona and Utah stipulates that land management practices, including hunting, should not be restricted as a result of the reintroduction program. During the public input and review process, the FWS and the Arizona and Utah state wildlife agencies assured the public that they would not pursue modifications or restrictions to the hunting regulations due to the presence of condors on lands within the 10(j) population area. AGFD has reviewed information available from the lead ammunition ban in California. The effectiveness of this ban is still inconclusive; regardless, neither approach has resulted in acceptable levels of lead exposure and lead-caused deaths.

2. *Determine whether there is an alternate location in the western U.S. where condors can be released with less exposure to lead contamination and can contribute to recovery. Develop a recovery program in a new location and either phase out or continue some releases in the Southwest.*

Recommendation: During the next five-year review period, the SCWG will conduct a habitat assessment that considers the use of lead ammunition and resulting exposure to scavengers. In addition to more closely assessing the amount of lead that condors are exposed to in the 10(j) area, this effort will also attempt to assess the amount of lead that exists in areas where condors do not currently occur. The model will be used to consider whether there are additional or better locations for condor releases and recovery in the western U.S.

3. *Terminate further release and management of condors in the Southwest. Continue to monitor the annual mortality and productivity of the population until recovery is achieved or the population fails. If the lead contamination problem is subsequently eliminated, condor reintroduction in the Southwest could be reconsidered.*

Recommendation: The SCWG believes that terminating releases at this time is premature. The captive breeding program has already produced birds that need to be released into the wild, while the recovery program has not yet located suitable additional releases sites. However, the partner agencies will seriously consider withdrawing support for condor reintroduction efforts in the Southwest if, by the end of the next five-year condor program review period (December 2016):

- A reduction of extreme lead exposures (measured by blood lead levels) as represented in Figure 3 is not achieved; and,
- A declining trend in diagnosed lead related mortality and morbidity is not achieved.

SCWG will continue to collaborate to develop the most appropriate protocol and metrics to evaluate lead exposure data.

4. *Remove the remaining condors in the Southwest and relocate them where they could better contribute to recovery goals. The condors could be returned to the captive*

*breeding program, released in existing sustainable populations in California or Mexico, or held for release at future sites that may be developed.*

Recommendation: Existing sites in California and Baja California are currently at capacity. In addition, there is no evidence that release sites in California and Mexico afford any greater protection or opportunities for condor population growth and maintenance than the Southwest release area. Relocating or releasing new birds into additional release sites would likely only provide short term benefits since even distant populations would eventually merge.

5. *Continue to implement the voluntary non-lead ammunition program in Arizona and work to develop and expand a non-lead ammunition program in Utah. Indications of progress will include a measurable reduction in lead exposure and consequent reduction in rates of lead-induced mortalities and morbidities of condors.*

Recommendation: In the spirit and intent of the 10(j) designation, the SCWG believes that, while addressing lead-caused mortality would enhance the success of the program, any such efforts should be voluntary. Consistent with positions advocated by State wildlife agencies, issues of lead ingestion by wildlife that may cause population level effects is a matter of wildlife management action that the SCWG believes is best dealt with by the states. Although the direct sources of lead exposure to condors cannot be determined with certainty, data presented in this review indicate that a voluntary program, such as the one established in Arizona, could have a significant positive impact on the population of condors in the 10(j) designation. Initial research suggests that if a similar program were implemented in Utah, it could allow for a self-sustaining population. The SCWG encourages the UDWR to establish its own program to encourage and incentivize the voluntary adoption of non-lead ammunition by hunters in condor range. The SCWG notes that UDWR has recently implemented a draw system for deer tags in southern Utah, and that they are now positioned to implement a program that could be focused on communicating with hunters in the condor 10(j) population area.

UDWR is willing to expand and improve lead reduction efforts within the southern portion of the state, using Arizona's program as a prototype; funding remains a significant hurdle to expanding Utah's program. Therefore, the group recommends actively pursuing alternate funding sources for lead reduction efforts, including funding from sportsman's groups, ammunition manufacturers and retailers, and conservation groups.

The SCWG also recommends expanding lead reduction efforts in both states to include small game, varmint, and predator hunters, as well as increasing outreach to ranchers, tribal communities, and private citizens who may dispatch domestic or feral animals.

The SCWG recommends continued communication with the California program field crew members and administrators so voluntary and mandatory lead reduction efforts can be realistically contrasted and compared.

## **Research Recommendations**

The SCWG recommends the following research activities be conducted during the next five years:

- Continue all research identified in Table 8 as “ongoing.”
- Use feather analysis to determine incidence and severity of lead exposure of wild-hatched fledglings.
- Use feather analysis to broaden our knowledge of the timing and magnitude of exposures beyond annual opportunistic blood-lead sampling.
- Employ improved techniques/products for GPS technology to better understand movements and mortality within the condor’s range.
- Use geospatial modeling to better understand the variables associated with the lead threat potential within a landscape.
- Develop methods to better estimate/evaluate lead-reduction efforts throughout the range of the reintroduced condors.
- Investigate the long-term implications of repeated lead exposure and multiple chelation treatments on condors.
- Reevaluate and improve metrics used to measure progress toward condor recovery.
- Evaluate the economic impacts of the condor program, including tourism.
- Work with California program and FWS condor program coordinator to ensure uniform basic data collection and reporting so data from all release programs can be compared.
- Work with FWS condor program coordinator to synthesize current basic data for the five-year review of the entire condor program.
- Determine and track Utah hunter participation in the voluntary non-lead ammunition program and the impact of Utah’s program on overall lead exposure.

## **Management Recommendations**

The SCWG recommends conducting the following management actions over the next five years:

- Continue all management actions identified in Table 10 as “ongoing” and “not completed”.
- Coordinate with tribes within the reintroduction area (Utah and Arizona) to participate in SCWG activities.
- Encourage increased involvement of federal agencies in Utah in working group activities.
- Invite Wildlife Services to participate in the SCWG.
- Provide condor program information and updates to counties within the 10(j) area (via Condor Cliffs site).
- Offer an annual condor presentation to counties within the 10(j) area.
- Provide contact information of permitted personnel who can follow up on complaints by private citizens regarding property damage, and provide training to landowners as needed to reduce private property damage.
- SCWG will participate with and work to encourage and coordinate lead reduction efforts and a lead reduction program in Utah.

## CONCLUSION

The Southwest condor recovery program has now been underway for 15 years, and the program has continued to make progress in several key areas. The overall number of free-ranging condors has continued to increase, and the birds are consistently using seasonal ranges. The number of breeding pairs has increased through this reporting period, and they have successfully hatched and fledged chicks each year. Pre-release conditioning of birds is helping to reduce or avoid undesirable behaviors. However, the most significant issue raised in the second program review, exposure to lead contamination, continues to affect both individual birds and the southwest population. Although voluntary efforts to reduce the use of lead ammunition in California condor range may help to reduce exposure to lead contamination among these birds, the SCWG agrees that further efforts to reduce the lead load available to scavenging birds are crucial for program success. The SCWG issues a challenge to all partners and to stakeholders interested in achieving condor recovery to help further support for this program in the Southwest and to assist with establishing an effective non-lead program within southern Utah.

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## APPENDICES

### Appendix A. Summary of public comments received

Public comments were solicited at the beginning of the third five-year review. The following is a summary of the comments that were received. Responses to the public comments are included in Table A-1, below.

1. Pleased with the direction of the program.
2. Perhaps add a feeding station to keep condors around the South Rim so more people could see them
3. One Tribe reported that it had no concerns with or comments on the program; they may wish further discussion if the range of the species moves more on to their traditional territory.
4. Appreciate having a permit for a condor specimen which has been used for 76 conservation presentations to 750 people since 2007.
5. Report of complaints about condors being a nuisance to homes in the Kolob (Utah) area.
6. Believes the project is a failure, a waste of money and resources, and funding should be terminated; it is exciting to see condors at Hermit's Rest; but a private firm should pay the costs with no agency funding.
7. Hopes the condor can survive lead poisoning, human blunderings, and shootings.
8. Hopes that the program and support for condor recovery continues.
9. Condors deserve continued protection; the Park Service provides great presentations about condors on the South Rim.
10. Enjoys seeing condors on recreation trips; reintroduction and education is worth the cost; recommend continued good management of the program.
11. Concerned about the continued threat of the 10j rule being lifted and the fact that condors are considered endangered on National Park Service lands.
12. Concerned about lead issue with potential impacts to hunters and shooters if they are required to not use lead ammunition.
13. Supports the continued 10j status and recommends the 10j area be expanded to include entire area condors are known to visit.
14. Requests that the 10j area be extended to include the entirety of Washington County, Utah.
15. Supports the condor reintroduction program; hopes the program will continue and result in the condor recovery goals of self-sustaining populations.
16. The number one threat to recovery of the condor is lead poisoning associated with spent lead ammunition in the environment; while the State of Arizona's voluntary non-lead ammunition program is commendable, condors and other wildlife continue to be exposed to, and sickened and killed by, lead ammunition.
17. Recommends continuing and enhancing public education regarding the importance of the condor, including avoidance of harmful human behavior.
18. Recommends supporting and promoting a ban on lead ammunition in the condor recovery area.

19. Recommends continuing to inform the firearms industry, sporting groups, and hunters about the lead poisoning problem, and why it is essential to ban lead ammunition in the condor recovery area.
20. Recommends continuing to offer free non-lead ammunition in the recovery area as a means of phasing out all lead ammunition.
21. Recommend continuing and increasing close monitoring to expedite information gathering and enable rapid response where negative events threaten condor recovery.
22. Recommends improving the recovery and analysis of condor carcasses.
23. Recommends continuing the lead testing and treatment program.
24. Recommends siting power lines or other developments that threaten condor recovery away from the recovery areas.
25. Recommends enforcing consequences for human harassment or harm of condors; offer rewards for information regarding shooting, harming, or harassing condors.
26. Recommends continued protection and management that maintains the primitive nature of condor habitat.
27. Recommends increasing scientific efforts regarding condor behavior, needs, and mortality factors.
28. Appreciate the efforts that the Fish and Wildlife Service is making to help endangered and threatened species to survive.
29. The letter requesting comments for the third five-year review should have included a summary of annual population and mortality rates.
30. The letter requesting public comment indicated that lead poisoning appears to be a factor that may prevent a self-sustaining population, but no information was provided that would support that indication; predation by coyotes is also a mortality factor which was not mentioned in the letter requesting comments.
31. It appears the FWS may be testing public perception regarding mandatory use of non-toxic bullets in the non-essential experimental area; would oppose any such consideration.
32. Supports the special rule establishing the non-essential experimental designation as interpreted in the Agreement between the FWS and Coalition of County and Local Governments (Agreement), and efforts by agencies to provide information on non-toxic bullets as it becomes available.
33. Assumes/recommends the five-year review address the goals of the 1996 California Condor Recovery Plan, and the nine points mentioned in the Agreement, Parties section, Item 7.
34. Encourages the FWS to provide the completed five-year review to the public before it is finalized, especially if it is used to determine whether the project should continue for an additional five years.
35. If the five-year review is used to determine whether the program will continue, a NEPA document should be prepared for the decision; would consider the decision to be a major federal action.
36. Receive very little information or updates regarding the program; would be good to receive an annual summary of program progress within county boundaries.
37. As long as the program continues under the MOU and Agreement, there will be little resistance to continue; if attempts are made to modify the special rules of the non-

- essential population designation, or if more restriction in land uses occur because of the condor, the public in the county will oppose such efforts.
38. Over \$10,000 of major condor damage to private property in the Kolob area can be documented.
  39. Although a variety of officials have been notified about condor damage in the Kolob area, little help has been provided.
  40. Reintroduced condors are non-essential and need approval from local private individuals to remain; if support is wanted from private individuals, then need to find means to pay for condor damage to private property.
  41. Offer of a photograph of a condor in California.
  42. Please continue to study the condor; need to improve interaction so that we are not harming them; lead poisoning could be a larger problem than we realize.
  43. Wants to see the documented condor mortality data published for the public.
  44. Doesn't understand how local government would incur any costs from the recovery program; the opposite should be true due to tourism.
  45. Doesn't see how condors could interfere with land use; maybe limiting hunting in certain areas or use only lead-free bullets.
  46. Happy to have condors back in their home range and that the recovery program is successful.
  47. Shared story of remarkable encounter with condors in Zion National Park; offered photograph to use in future condor recovery.
  48. Cannot believe the attention that the condor, a non-native and invasive species, receives from those who oppose hunting and trapping.
  49. A ban of lead bullets would never be lifted and would price hunters out of hunting.
  50. Providing non-lead ammunition to hunters is an ulterior motive to ban lead in order to destroy the heritage of hunting in the West.
  51. The condor and the Southwest California condor program is a threat to the West's wild places.
  52. Fears that new laws and bans will price hunters out of hunting and that is the only reason opposes the condor program.
  53. Voices full support for the reintroduction of condors.
  54. Would like to see more condors introduced to their former range across the southwest.
  55. Recommends that the cooperating agencies in the reintroduction program do more to encourage states and other regulatory agencies to ban lead ammunition in current and potential condor habitat.
  56. Recommends heavy fines and jail time for those convicted of harming or killing condors.
  57. Important Bird Areas where the condor occurs qualify as globally significant; Marble Canyon and Zion National Park have been so identified.
  58. Commends the excellent working partnerships with TPF, the Phoenix Zoo, Liberty Wildlife, and AGFD; they as well as others (volunteers, veterinarians) should be recognized.
  59. The 10j classification has provided opportunities to chelate lead and enhance the restoration of the species.
  60. The use of lead ammunition presents a threat to the success of the recovery effort; food sources contaminated with lead ammunition still prove to be lethal to condors.

61. Considers the problem of adult mortality from lead ingestion to be a serious problem which demands high priority for resolution.
62. Perceives that the general public is unaware of the severity of the lead poisoning problem and thus does not discern that the background mortality levels necessitate repetitive releases of captive-bred birds.
63. Co-hosted a workshop to provide information about recovery strategy and to encourage support for the use of non-lead ammunition.
64. In addition to lead issues, lack of an adequate year-long food source will influence development of a self-sustaining condor population.
65. Supplemental feeding of condors will probably be necessary indefinitely resulting in an artificial project especially with a population goal of 150 individuals.
66. Recommends working to encourage the use of non-lead ammunition as a voluntary program in Utah.
67. Recommends reducing the population goal from 150 to 60 individuals.
68. Recommends an assessment of current demographics and determine what age and sex ratios are needed to sustain a population of 60 individuals; work toward that population structure.
69. Recommends when reporting sources of mortality, include predation, unexplained losses, and accidental deaths.
70. Recommends retaining 10j status for the current project and any future condor reintroductions in the southwest.
71. Recommends maximizing the role of the Peregrine Fund in the project.
72. Condor populations did not historically occur in southern Utah.
73. The reintroduction of condors has caused thousands of dollars of damage to private property.
74. Recommends creating a fund to pay for damages caused by non-native condors.
75. Contemplating installation of electrified screens on cabin.
76. Please control or pay for extensive condor damage before private citizens have to protect private property.
77. Many requests for assistance with and reimbursement for damages have been submitted to no avail.
78. Without a process for landowners to receive compensation for damages by condors, it will be difficult to obtain support for the program.
79. Please continue the condor program.
80. Please help eradicate lead in bullets so condors can be saved.
81. Recovery projects like this are extremely valuable to save these unique creatures; please continue programs such as this one.
82. Thankful for the experience of observing condors and for the efforts to reintroduce them.
83. In the final rule, does the 40 percent mortality refer to an annual rate or to the entire five-year period? Success of the program should be judged by how closely annual mortality approaches five percent or less (survival 95 percent or more) of the total population. Productivity of the reintroduced population should be evaluated in a similar way.
84. Is the level of protection under the final rule sufficient to continue the program another five years? Only if it is considered ethically and financially justified to continue supporting the free-flying population with additional releases each year to compensate for

- abnormally high mortality and low productivity. The review should consider those two major caveats.
85. Have the effects of poisoning from spent lead bullets and shot been measurably reduced during the third five-year period? If not, what specific actions will be taken in the fourth period to insure that this goal is met? Adding Utah to the mix probably will not be enough.
  86. In addition to listing the number of nesting attempts and successful pairs, each breeding year should also include data on how many breeding age (seven or more years of age) females are in the population.
  87. It is not clear what "toxicity" means. Does it mean potentially lethal levels of lead?
  88. When reporting lead testing results, the review should clearly explain such concepts as numbers, percentages, "number trapped" and "number tested." Numbers should be included even when presenting percentages. Discussion of trends regarding decreases or increases in lead parameters should include statistical inferences.
  89. Can a statement be made about how many condors died from ingesting shotgun pellets and how many from bullet fragments?
  90. Is Green et al. (2009) an appropriate reference? Other more direct and understandable information is probably available.
  91. More consideration needs to be given to exactly how voluntary compliance from shooting constituencies can be achieved. What specific actions will be undertaken in the next five-year period?
  92. Are detailed statements from the Audubon Society, Iron County, and Washington County appropriate for inclusion in the review? They should simply be included as and with the other public comments.
  93. Text regarding Bill Burnham should be singled out as a separate paragraph.
  94. Wildlife Services should be represented on the SCWG. WS could be a supplier of food for condors if they use only non-lead ammunition in their operations.
  95. The review should not be an apology for continuing business as usual. It should provide a broader perspective of possible options that could be undertaken instead of continuing the program of the past five years. Continuing on the present course is not the only thing to do, and should not be accepted without careful consideration of other options. There are about five options to consider.

*Table A-1. Responses to public comments.*

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
Add a feeding station to keep condors around the South Rim so more people can see them.	The overall goal is for condors to find their own food. Feeding stations will be used only if necessary for management. Visitors may observe condors at several locations, including the South Rim, throughout the year.	Biology and Management
The reintroduction of condors has caused thousands of dollars	Landowners should contact the TPF, UDWR, or FWS personnel	Administration, Participating Agencies

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
<p>of damage to private property. Condors are a nuisance to homes in the Kolob area. Over \$10,000 of major condor damage to private property in the Kolob area can be documented. Although a variety of officials have been notified about condor damage in the Kolob area, little help has been provided. Many requests for assistance with and reimbursement for damages have been submitted to no avail.</p>	<p>identified in “Participating Agencies and Organizations” section. These individuals are near the areas where problems have occurred in the past, are permitted to conduct hazing activities as needed, and can provide recommendations to property owners to reduce impacts.</p>	<p>and Organizations</p>
<p>Recommends creating a fund to pay for damages caused by non-native condors. Please control or pay for extensive condor damage before private citizens have to protect private property; contemplating installation of electrified screens on cabin. Reintroduced condors are non-essential and need approval from local private individuals to remain; if support is wanted from private individuals, then need to find means to pay for condor damage to private property. Without a process for landowners to receive compensation for damages by condors, it will be difficult to obtain support for the program.</p>	<p>The Federal government does not reimburse individuals for such damages. By law, UDWR can only reimburse for damages due to wildlife as approved by the State Legislature. The Utah Legislature has not approved depredation payments for condor damages. Please see Participating Agencies and Organizations section for local contacts available to respond to complaints.</p>	<p>Administration, Participating Agencies and Organizations</p>
<p>The project is a failure and a waste of money and resources. A private firm should pay the costs with no agency funding.</p>	<p>The project has demonstrated several successes, including reproduction in the wild. Funding provided by a variety of recovery partners, including government agencies and non-government entities, are essential to the ultimate success of the program.</p>	<p>Introduction, Biology and Management, Administration</p>
<p>Concerns about the continued threat of the 10j rule being lifted, and the fact that condors are</p>	<p>There are no plans to rescind the nonessential experimental designation for the Southwest</p>	<p>Administration</p>

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
considered endangered on National Park Service lands.	population. For the purposes of section 7 consultation under the ESA, condors are considered a threatened species when on National Park System lands. Many consultations have been conducted under those requirements with no significant issues.	
Federal land managers have instituted criteria in environmental documents for activities in areas used by condors; these restrictions add to the burden of project approval.	FWS has worked with federal land managers to develop voluntary conservation measures to minimize the effects of project activities on condors. We are not aware of any instances when measures have been required solely to reduce effects to condors, or when they have added requirements to the project approval process.	Administration, See also Southwest Condor Review Team (2007)
Concerns about potential impacts to hunters and shooters if they are required to not use lead ammunition.	Lead reduction efforts remain voluntary. However, because non-lead ammunition is becoming more available in a variety of calibers, the relative cost may continue to decrease, and most users of non-lead ammunition report satisfaction, we have not identified any potential impacts to hunters.	Biology and Management
The 10j status should be continued and the 10j area should be expanded to include the entire area condors are known to occur. The 10j area should be extended to include the entirety of Washington County, Utah. Retain 10j status for the current project and any future condor reintroductions in the southwest. The 10j classification has provided opportunities to chelate lead and enhance the restoration of the species.	The current 10(j) area contains the vast majority of current condor movements. There are no plans to discontinue or expand the nonessential experimental population area. Proposals to expand the experimental area were considered, and the recovery partners decided to not pursue them. How condor reintroductions will be conducted in the future will be determined on a case-by-case basis.	Administration

Issue	Response	Reference In This Document
Continue and enhance public education regarding the importance of the condor, including avoidance of harmful human behavior.	The recovery partners continue to conduct a variety of outreach efforts, both in and out of the field.	Lead Reduction Efforts, Administration
The number one threat to recovery of the condor is lead poisoning associated with spent lead ammunition in the environment. A ban on lead ammunition in the condor recovery area should be supported and promoted. The cooperating agencies in the reintroduction program should do more to encourage states and other regulatory agencies to ban lead ammunition in current and potential condor habitat.	The recovery partners are not promoting a ban on lead ammunition for reasons identified in this review. Continuation and significant expansion of voluntary non-lead ammunition programs is recommended.	Lead Reduction Efforts, Recommendations
Continue to inform the firearms industry, sporting groups, and hunters about the lead poisoning problem, and why it is essential to ban lead ammunition in the condor recovery area.	Informing a variety of entities about the lead poisoning problem has and will continue to be done. The recovery partners have not promoted a lead ban with these entities.	Lead Reduction Efforts, Research and Management Actions, Recommendations, Appendix D, Appendix E
Continue to offer free non-lead ammunition in the recovery area as a means of phasing out all lead ammunition.	Free non-lead ammunition will be made available by the state agencies to the degree that funding allows.	Lead Reduction Efforts
Continue and increase close monitoring to expedite information-gathering and enable rapid response where negative events threaten condor recovery.	Due to the continuing threat of lead poisoning, intensive management of condors will continue to be necessary.	Biology and Management, Research and Management Actions
Improve the recovery and analysis of condor carcasses.	All reasonable efforts will continue to be made to recover condor carcasses and determine the cause of death.	Biology and Management, Research and Management Actions
Continue the lead testing and treatment program.	As long as condors and lead occur together, lead testing and treatment will be a necessary component of management.	Biology and Management, Research and Management Actions

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
Power lines or other developments that threaten condor recovery should be sited away from the recovery areas.	There are a variety of means, including NEPA and the ESA, to consider and address proposed actions that may affect condors and their recovery.	Administration
Enforce consequences for human harassment or harm of condors; offer rewards for information regarding shooting, harming, or harassing condors. There should be heavy fines and jail time for those convicted of harming or killing condors.	Every effort has been made, and will continue to be made, to enforce current laws and regulations that protect condors. The existing laws and regulations include penalties for conviction.	Administration
Continue protection and management that maintains the primitive nature of condor habitat.	In general, the Southwest recovery program must be focused on management of the condor population. Managers of the land that constitutes condor habitat are also condor recovery partners. Efforts will continue to maintain and manage condor habitat in a manner that will promote their recovery.	Administration
Increase scientific efforts regarding condor behavior, needs, and mortality factors.	Many such efforts have been conducted and will continue by a variety of interested parties.	Biology and Management, Lead Reduction Efforts, Research and Management Actions, Appendix C, Appendix F
The letter requesting comments for the third five-year review should have included a summary of annual population and mortality rates.	One purpose of the review is to develop that information. The letter did provide a brief summary of the condor population and mortalities. It also indicated where the previous five-year review could be accessed, in case recipients were interested in reviewing the most recent information in detail.	Introduction, Biology and Management
The letter requesting public comment indicated that lead poisoning appears to be a factor that may prevent a self-	The letter was based on preliminary information including discussion and conclusions that were presented in the previous	Introduction, Biology and Management

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
<p>sustaining population, but no information was provided that would support that indication. Predation by coyotes is also a mortality factor which was not mentioned in the letter requesting comments.</p>	<p>five-year review. That preliminary information suggested that mortality due to lead was probably more of a chronic problem than predation by coyotes. One purpose of the review is to determine the relevance of all mortality factors to the condor population and species recovery.</p>	
<p>It appears the FWS may be testing public perception regarding mandatory use of non-toxic bullets in the non-essential experimental area. Would oppose any such consideration.</p>	<p>The FWS has not been testing such public perception and has no plans to do so. The purpose of the review is clearly stated.</p>	<p>Introduction, Recommendations</p>
<p>Supports the special rule establishing the non-essential experimental designation as interpreted in the Agreement between the FWS and Coalition of County and Local Governments (Agreement), and efforts by agencies to provide information on non-toxic bullets as it becomes available.</p>	<p>There are no plans to alter the rule that designated the nonessential experimental population in the Southwest. Information on non-lead ammunition will continue to be provided in a variety of ways.</p>	<p>Administration, Recommendations</p>
<p>Assumes/recommends the five-year review address the goals of the 1996 California Condor Recovery Plan, and the nine points mentioned in the Agreement, Parties section, Item 7.</p>	<p>The review includes a discussion of recovery goals relevant to the Southwest population and their status, including the status of recovery implementation and the points in the Agreement.</p>	<p>Administration</p>
<p>Encourages the FWS to provide the completed five-year review to the public before it is finalized, especially if it is used to determine whether the project should continue for an additional five years.</p>	<p>The five-year review is not a decision-making document, so we do not plan to provide a draft for public review and comment. The public will be notified when the review is finalized, and it will be available on the internet, with hardcopies furnished upon request. Comments regarding the condor program are welcome at any time and will be considered during the next review.</p>	<p>Introduction</p>

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
If the five-year review is used to determine whether the program will continue, a NEPA document should be prepared for the decision. Would consider the decision to be a major federal action.	The five-year review is not a decision document, but makes recommendations to the FWS Region 8 director about the program. Any subsequent decision regarding the program would be reviewed for compliance with NEPA requirements.	Introduction
One county would like to receive an annual summary of program progress within county boundaries.	This request has been considered and incorporated into the recommendations for the program.	Recommendations
As long as the program continues under the MOU and Agreement, there will be little resistance to continue. If attempts are made to modify the special rules of the non-essential population designation, or if more restriction in land uses occur because of the condor, the public in the county will oppose such efforts.	This review does not propose any changes to the program as it functions under the MOU or Agreement, or a change to the 10(j) population status.	Administration
The documented condor mortality data should be published for the public.	This review includes a presentation and discussion of condor mortality data.	Biology and Management
A ban of lead bullets would never be lifted and would price hunters out of hunting.	A ban on lead ammunition has not been proposed in this review. An analysis of effects of a ban on hunters is beyond the scope of this review.	Lead Reduction Efforts, Recommendations
Providing non-lead ammunition to hunters is an ulterior motive to ban lead in order to destroy the heritage of hunting in the West.	Programs to provide non-lead ammunition are intended solely to reduce the amount of lead in the environment. The intent of these efforts is to also reduce the amount of sickness, death, and treatment of condors due to lead poisoning.	Lead Reduction Efforts, Recommendations
More condors should be introduced to their former range across the Southwest.	Although there are no current plans to do so, additional reintroductions may be initiated within the historical range of the condor in order to achieve recovery of the species. An	Administration

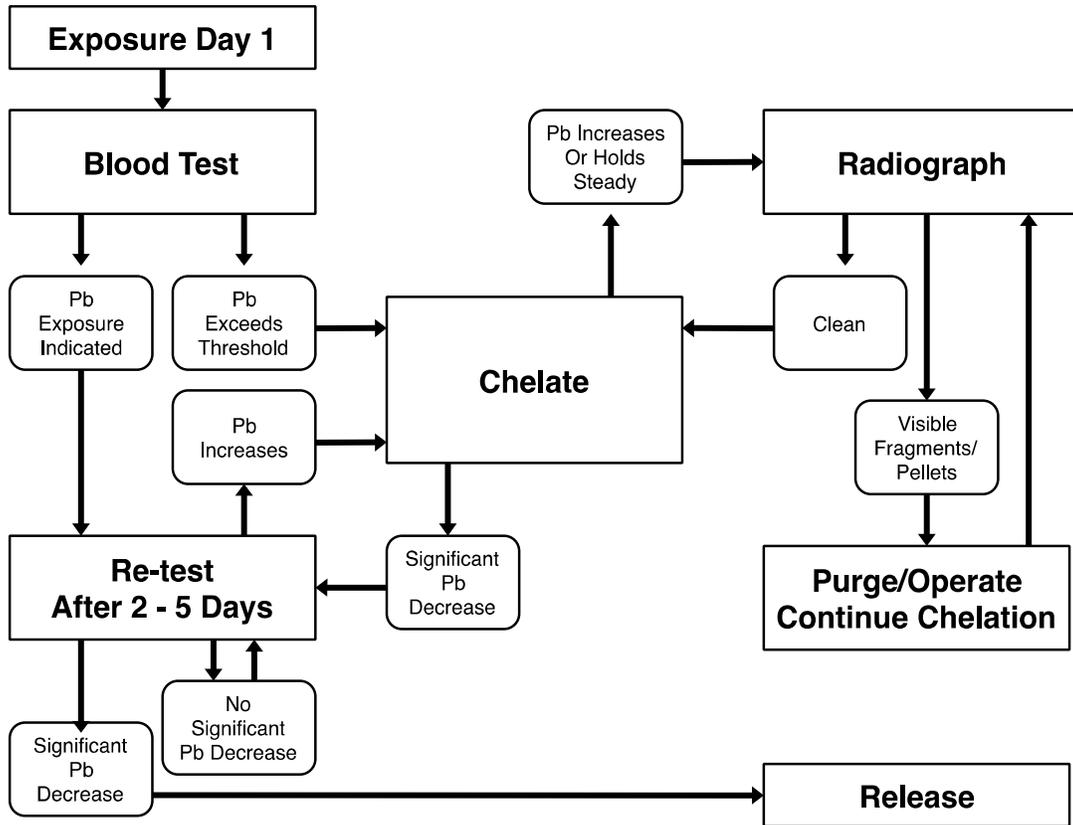
Issue	Response	Reference In This Document
	additional reintroduction effort has started in Baja California, Mexico.	
The use of lead ammunition presents a threat to the success of the recovery effort; food sources contaminated with lead ammunition still prove to be lethal to condors. The problem of adult mortality from lead ingestion is a serious problem which demands high priority for resolution.	The previous and this five-year review discuss the seriousness of the threat of lead poisoning to condors and their recovery, and the need to resolve the issue.	Biology and Management, Lead Reduction Efforts, Research and Management Actions, Recommendations
The general public is unaware of the severity of the lead poisoning problem and thus does not discern that the background mortality levels necessitate repetitive releases of captive-bred birds.	This review discusses the impacts of lead on the condor population.	Biology and Management
Will supplemental feeding of condors probably be necessary indefinitely resulting in an artificial project especially with a population goal of 150 individuals?	Supplemental feeding occurs primarily to facilitate the trapping of condors for the purpose of blood testing for exposure to lead.	Biology and Management
Encourage the use of non-lead ammunition as a voluntary program in Utah.	The SCWG partners continue to encourage and support voluntary non-lead programs in Arizona and Utah.	Lead Reduction Efforts, Research and Management Actions, Recommendations
Reduce the project population goal from 150 to 60 individuals. Conduct an assessment of current demographics, determine what age and sex ratios are needed to sustain a population of 60 individuals; and work toward that population structure.	Overall recovery goals are determined by the FWS in conjunction with the California Condor Recovery Team, and not by the SCWG. Recovery criteria would be considered during any revision of the recovery plan.	Administration
When reporting sources of mortality, include predation, unexplained losses, and accidental deaths.	The review reports all sources of mortality.	Biology and Management
Maximize the role of the Peregrine Fund in the project.	The role of TPF is at a maximum level. In addition to conducting	Biology and Management

Issue	Response	Reference In This Document
	day-to-day field management operations, TPF also produces condors in its captive management program.	
Condor populations did not historically occur in southern Utah.	Fossil records show that condors once ranged across most of the southern U.S east to Florida and north to New York. By the time European people arrived in western North America, condors occurred only along the Pacific coast from Canada to Baja California. However, there is one credible record in Beaver County ~1872 and another in western Iron County prior to 1932.	Literature Cited (USFWS 1996a and USFWS 1996b)
In the final rule, does the 40 percent mortality refer to an annual rate or to the entire five-year period? Success of the program should be judged by how closely annual mortality approaches five percent or less (survival 95 percent or more) of the total population. Productivity of the reintroduced population should be evaluated in a similar way.	The 40 percent mortality figure in the final rule refers to the first five years of the program. The final rule does not provide specific parameters for determining whether the program should proceed or not beyond that period.	Introduction
Is the level of protection under the final rule sufficient to continue the program another five years? Is it ethically and financially justified to continue supporting the free-flying population with additional releases each year to compensate for abnormally high mortality and low productivity? The review should consider those two major caveats.	The SCWG recommendations and rationale for continuing the program have been included in this review.	Research and Management, Recommendations
Have the effects of poisoning from spent lead bullets and shot been measurably reduced during the third five-year period? What	The review illustrates how the effects of lead poisoning to condors continued in the third five-year period. Specific future	Biology and Management, Lead Reduction Efforts, Research and

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
specific actions will be taken in the fourth period to insure that this goal is met? Adding Utah to the mix may not be enough.	actions to address the problem are included in the review.	Management Actions, Recommendations
In addition to listing the number of nesting attempts and successful pairs, each breeding year should also include data on how many breeding age (seven or more years of age) females are in the population.	The review includes the number of breeding females each year based on a breeding age of nine years.	Biology and Management
It is not clear what "toxicity" means. Does it mean potentially lethal levels of lead?	Reference to toxicity has been replaced with a discussion of levels of exposure to lead.	Biology and Management
When reporting lead testing results, the review should clearly explain such concepts as numbers, percentages, "number trapped" and "number tested." Numbers should be included even when presenting percentages. Discussion of trends regarding decreases or increases in lead parameters should include statistical inferences.	Numbers and percentages associated with lead testing are included in the review.	Biology and Management
Can a statement be made about how many condors died from ingesting shotgun pellets and how many from bullet fragments?	Known information is provided in the discussion of mortality in the review.	Biology and Management
Is Green et al. (2009) an appropriate reference? Other more direct and understandable information is probably available.	The review includes the references available that are pertinent to a discussion of lead and its effects on condors.	Biology and Management, Appendix C, Appendix F
More consideration needs to be given to exactly how voluntary compliance from shooting constituencies can be achieved. What specific actions will be undertaken in the next five-year period?	Specific considerations and recommended actions are included in the review.	Lead Reduction Efforts, Research and Management Actions, Recommendations

<b>Issue</b>	<b>Response</b>	<b>Reference In This Document</b>
<p>Are detailed statements from the Audubon Society, Iron County, and Washington County appropriate for inclusion in the review? They should simply be included as and with the other public comments.</p>	<p>The letters requesting comments from the public included a portion that requested specific information from cooperators, agencies, and interested parties. The Audubon Society, Iron County, and Washington County all chose to respond to those specific questions, so we included this information in the Project Costs discussion.</p>	<p>Introduction, Administration</p>
<p>Text regarding Bill Burnham should be singled out as a separate paragraph.</p>	<p>The recommendation was implemented.</p>	<p>Administration</p>
<p>Wildlife Services should be represented on the SCWG. WS could be a supplier of food for condors if they use only non-lead ammunition in their operations.</p>	<p>We have included a recommendation to invite Wildlife Services to participate in the SCWG.</p>	<p>Administration, Recommendations</p>
<p>The review should provide a broader perspective of possible options that could be undertaken instead of continuing the program of the past five years. Continuing on the present course is not the only thing to do, and should not be accepted without careful consideration of other options.</p>	<p>The review discusses a full range of options for the program and the recommendation of the SCWG for the next five years.</p>	<p>Recommendations</p>

**Appendix B. Condor lead poisoning treatment procedure**



## Appendix C. Abstracts referred to in the Lead Research section

### **Bullet Fragments in Deer Remains: Implications for Lead Exposure in Avian Scavengers**

Grainger Hunt (1), W. Burnham (1), C.N. Parish (1), K.K. Burnham (1), B. Mutch (1), and J.L. Oaks (2). 2006.

(1) *The Peregrine Fund, 5668 W. Flying Hawk Lane, Boise, ID 83709*

(2) *Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA 99164*

Bullet fragments in rifle-killed deer (*Odocoileus* spp.) carrion have been implicated as agents of lead intoxication and death in bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), California condors (*Gymnogyps californianus*), and other avian scavengers. Deer offal piles are present and available to scavengers in autumn, and the degree of exposure depends upon incidence, abundance, and distribution of fragments per offal pile and carcass lost to wounding. In radiographs of selected portions of the remains of 38 deer supplied by cooperating, licensed hunters in 2002–2004, we found metal fragments broadly distributed along wound channels. Ninety-four percent of samples of deer killed with lead-based bullets contained fragments, and 90% of 20 offal piles showed fragments: 5 with 0–9 fragments, 5 with 10–100, 5 with 100–199, and 5 showing >200 fragments. In contrast, we counted a total of only 6 fragments in 4 whole deer killed with copper expanding bullets. These findings suggest a high potential for scavenger exposure to lead.

### **Evidence for the Source of Lead Contamination within the California Condor**

John Chesley (1), Peter Reinthal (1), Chris Parish (2), Kathy Sullivan (3), and Ron Sieg (3). 2009.

(1) *The University of Arizona, Tucson Arizona, 85721*

(2) *The Peregrine Fund, HC 31 Box 22, Mormon Lake, AZ 86038*

(3) *Arizona Game and Fish Department, 3500 S. Lake Mary Road, Flagstaff, AZ 86001*

The California condor (*Gymnogyps californianus*) is the largest bird species in North America. Prior to the 20th century these birds were abundant along the western coast of the U.S. and Mexico. However, losses of habitat, natural predation, hunting, and environmental contamination have all been thought to contribute to a precipitous population decline. Early studies suggested that the demise of the condor population was in part the result of incidental Pb poisoning from either direct ingestion of lead fragments from hunter-killed game or indirectly as the result of biologically incorporated Pb from the environment. A recent article for the National Rifle Association (Wright and Peddicord, 2007) suggested that although condors are most likely adversely affected by elevated lead in their tissues and lead ammunition is used in condor range, there is little scientific evidence of actual ingestion of lead ammunition by condors, and there is little scientific evidence that the lead in the tissues of condors can be traced to ammunition. Condors in Arizona are periodically captured and monitored for blood Pb concentrations; subsets of these blood samples were analyzed for Pb isotopic ratios. To date, Pb isotopic ratios have been measured in blood in 47 birds over 3 years. Multiple measurements have been undertaken on 18 birds, including metal fragments collected at the same time from 2 different birds. Birds with elevated blood Pb levels are isolated, x-rayed and the excrement is monitored for metal fragments. Twelve fragments were collected from 6 different birds. Analyses of the metal

fragments from these birds determined that the fragments were Pb, Cu, Fe-Cr alloy and Pb-Sn alloy. We present Pb isotopic evidence that directly links ingested Pb fragments to Pb in the blood of condors. One condor was found to have metal fragments in both 2004 and 2007 and had differing blood Pb isotopic ratios, which were within analytical error of the fragments collected at the same time. In addition to identifying the possible source(s) of Pb in the blood of condors, lead isotopic measurements can be used to discern if the condor has undergone a significant poisoning event between blood collection periods and provide insight into the number of Pb toxicity events over the lifetime of a bird. These results support the hypothesis that bullet fragments are causing increased blood lead levels in condors, and that poisoning events are occurring often.

### **Lead Exposure Among a Reintroduced Population of California Condors in Northern Arizona and Southern Utah**

Christopher N. Parish (1), W. Grainger Hunt (1), Edward Feltes (1), Ron Seig (2), and Kathy Orr (3). 2009.

(1) *The Peregrine Fund, 5668 Flying Hawk Lane, Boise, ID 83709*

(2) *Arizona Game and Fish Department, 3500 South Lake Mary Road, Flagstaff, AZ 86001*

(3) *The Phoenix Zoo, 455 North Galvin Parkway, Phoenix, Arizona 85008*

Lead poisoning remains the leading cause of death among free-ranging California condors released by The Peregrine Fund in Arizona during 1996-2007 in an ongoing effort to establish a self-sustaining population. Daily monitoring of radio-tagged condors by means of VHF and GPS telemetry shows them ranging from the Grand Canyon National Park to the Zion region of southern Utah. Increased proficiency at finding carrion in the wild corresponds with a greater incidence of lead exposure. Periodic testing reveals spikes in blood lead levels during November and December commensurate with the deer hunting seasons and condor movement to deer hunting areas. These data combined with information collected on food types supports the hypothesis that lead ammunition residues in rifle- and shotgun-killed animals are the principle source of lead contamination among scavengers in northern Arizona and southern Utah. Sustaining the population requires an intensive management regime of testing and treatment for lead exposure. Reducing or eliminating the availability of lead is essential to reestablishment of condors in the wild.

### **Voluntary Lead Reduction Efforts within the Northern Arizona Range of the California Condor**

Ron Sieg (1), Kathy A. Sullivan (1) and Chris N. Parish (2). 2009.

(1) *Arizona Game and Fish Department, 3500 South Lake Mary Road, Flagstaff, AZ 86001*

(2) *The Peregrine Fund, HC 31 Box 22, Mormon Lake, AZ 86038*

Lead exposure is a significant factor affecting the success of the California condor (*Gymnogyps californianus*) reintroduction program in northern Arizona and southern Utah. Lead toxicity is currently the leading cause of mortality, with twelve confirmed cases, and the primary obstacle to a self-sustaining condor population. Research has identified incidental ingestion of spent lead ammunition found in animal carcasses and gut piles as the major lead exposure pathway. Peaks in condor lead exposure rates have corresponded with big game hunting seasons on the Kaibab Plateau in northern Arizona. In response, the Arizona Game and Fish Department (AGFD)

initiated a public education campaign in 2003 promoting voluntary lead reduction actions within condor range, including the use of non-lead ammunition by hunters. In addition, the AGFD implemented a free non-lead ammunition program for the 2005 and 2006 fall big game hunting seasons. This program resulted in 50-60 percent voluntary compliance from Kaibab deer hunters. Although this represented an unprecedented voluntary effort, lead exposure data suggested that a 50-60 percent reduction in lead-laden carrion was not sufficient to achieve a self-sustaining population of free-foraging condors. Consequently, lead reduction efforts were intensified in 2007. Modifications included improved hunter outreach in the form of articles in sportsman's publications; distribution of an educational DVD and brochure; increased field communication; and added incentives for deer gut pile retrieval. Despite non-lead ammunition supply problems, 2007 voluntary efforts were successful and yielded over an 80 percent compliance rate from hunters. No lead toxicity fatalities occurred during the 2007 hunting season and preliminary data suggests that condor lead exposure rates declined slightly. Voluntary lead reduction efforts must be further augmented to achieve a self-sustaining condor population, however. Future lead reduction efforts should also include southern Utah.

### **Modeling Blood Lead Concentration and Exposure in Free-ranging California Condors in Arizona and Utah**

Rhys E. Green (1), W. Grainger Hunt (2), Chris N. Parish (2) and Ian Newton (3). 2009.

(1) *Royal Society for Protection of Birds and Cambridge University, U.K.*

(2) *The Peregrine Fund, 5668 West Flying Hawk Lane, Boise ID 83709*

(3) *Royal Society for Protection of Birds, U.K.*

California Condors (*Gymnogyps californianus*) released into the wild in Arizona ranged widely in Arizona and Utah. Previous studies have shown that the blood lead concentrations of many of the birds rise because of ingestion of spent lead ammunition. Condors were routinely recaptured and treated to reduce their lead levels as necessary but, even so, several died from lead poisoning. We used tracking data from VHF and satellite tags, together with the results of routine testing of blood lead concentrations, to estimate daily changes in blood lead level in relation to the location of each bird. The mean daily increment in blood lead concentration depended upon both the location of the bird and the time of year. Birds that spent time during the deer hunting season in two areas in which deer were shot with lead ammunition (Kaibab Plateau (Arizona) and Zion (Utah)) were especially likely to have high blood lead levels. The influence upon blood lead level of presence in a particular area declined with time elapsed since the bird was last there. We estimated the daily blood lead level for each bird and its influence upon daily mortality rate from lead poisoning. Condors with high blood lead over a protracted period were much more likely to die than birds with low blood lead or short-term elevation. We simulated the effect of ending the existing lead exposure reduction measures at Kaibab Plateau, which encourage the voluntary use of non-lead ammunition and removal of gut piles of deer and elk killed using lead ammunition. The estimated mortality rate due to lead in the absence of this program was sufficiently high that the condor population would be expected to decline rapidly. The extension of the existing lead reduction program to cover Zion (Utah), as well as the Kaibab plateau, would be expected to reduce mortality caused by lead substantially and allow the condor population to increase.

## Appendix D. Outreach letter mailed to hunters eligible for non-lead ammunition program



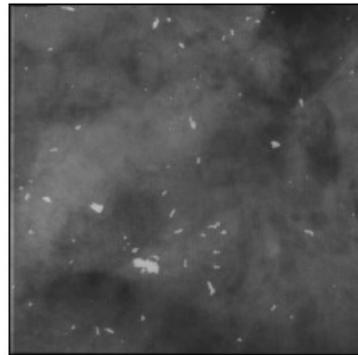
**Congratulations Successful Tag Holder  
You are eligible for FREE AMMUNITION to use on your hunt!**

- o Your upcoming deer hunt is within the core range of the California condor.
- o Lead poisoning is the leading cause of condor death and the only major obstacle to achieving a self-sustaining condor population in Arizona and Utah.
- o At least nineteen condors have died from lead poisoning and over 450 cases of lead exposure have been documented in the population since 1999.
- o Scientific studies have concluded that lead shot and bullet fragments found in game carcasses and gut piles are the main source of this lead (see [azgfd.gov/condor](http://azgfd.gov/condor)).
- o Please help reduce lead poisoning in condors and continue hunters' proud tradition of wildlife conservation by using non-lead ammunition during your upcoming hunt OR removing ALL game remains from the field.
- o **For the past four years 80%-90% of your fellow Arizona hunters have participated in our voluntary lead reduction program, please join them!**

**Lead Bullets Fragment:**



**Deer carcass containing lead fragments**



**Gut pile containing lead fragments**

X-rays of a deer shot with a typical copper-jacketed lead rifle bullet demonstrate that lead bullets fragment into hundreds of pieces which remain in game carcasses and gut piles (bullet fragments appear bright white in x-rays).

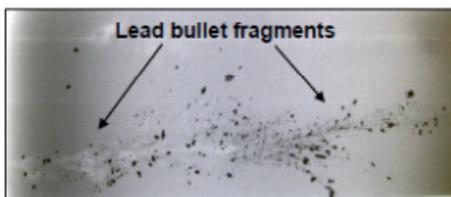
(OVER)

**Condors Ingest this Lead:**

Condors ingest lead shot and bullet fragments when they feed on game carcasses and gut piles left in the field by hunters. Since condors are group feeders, several birds can ingest lead from just one carcass or gut pile. One lead shot or bullet fragment can be enough to poison a condor.

**Hunters Praise Non-lead Bullets:**

All-copper bullets have superior knock-down power, are less toxic, and do not fragment like lead. 93% of hunters say non-lead bullets perform the same as or better than lead on game.



X-ray of a "bonded" lead bullet shot into ballistics gelatin (simulates animal tissue). Hundreds of small lead fragments are dispersed along the entire wound channel. These lead fragments remain in game carcasses and gut piles left in the field.



Picture of an all-copper bullet shot into ballistics gelatin. Copper bullets generate devastating hydraulic shock without leaving toxic bullet fragments in game carcasses and gut piles, helping prevent lead poisoning in condors.

The **Arizona Game and Fish Department** and our partners, the **Arizona Deer Association**, **Arizona Antelope Foundation**, **Arizona Elk Society**, **Arizona Desert Bighorn Sheep Society**, and the **Arizona Chapter of the National Wild Turkey Federation** are asking you to use non-lead ammunition OR remove your entire game carcass (including small game and varmints) from the field on your upcoming hunt.

**PLEASE SEE THE ENCLOSED INFORMATION ON HOW TO OBTAIN YOUR FREE PREMIUM NON-LEAD AMMUNITION!**

**If ammunition in the caliber of your choice is not listed or if you have any questions regarding this program, please contact the Department's condor program coordinator at [ksullivan@azgfd.gov](mailto:ksullivan@azgfd.gov) or 928-214-1249.**

**Please help us prove to our critics that Arizona hunters are among the country's best wildlife conservationists and that we can solve this problem on our own, voluntarily!**

**THANK YOU!**



## **Appendix E. Actions taken in Arizona to reduce lead exposure in condors**

### **2002**

- TPF met with AGFD to discuss condor lead exposure issues

### **2003**

- Hunter awareness surveys and focus groups
- Condor-lead page in hunting regulations
- Letters to big game hunters in condor range asking them to take lead reduction actions
- Outreach message focused on hunters' proud tradition of wildlife conservation
- Lead bullet fragmentation study
- AGFD starts providing non-lead ammo to Law Enforcement to dispatch animals

### **2004**

- Condor-lead page in hunting regulations and letters to hunters
- Hunter survey at Kaibab check station to determine non-lead ammunition use
- Lead exposure location/seasonality transmitter study
- Outreach to turkey and varmint hunters started
- Condor web page

### **2005**

- Condor-lead page in hunting regulations and letters to hunters
- Lead reduction message added to all condor presentations
- Condor coalition of local sportsmen's groups created
- Condor-lead webpage created
- "One-voice" cooperators training for lead reduction outreach
- Outreach message more focused and direct and included results from condor-lead research: lead exposure data; exposure seasonality/location data; lead bullet fragmentation data
- Lead isotope study initiated
- AGFD funds on-site condor treatment facility/x-ray machine
- Free non-lead ammunition program begins
- Post hunt survey to gauge participation

### **2006**

- Condor-lead page in hunting regulations/letters to hunters/condor-lead webpage
- Condor coalition expanded to include all major Arizona groups
- Free ammunition program
- Field outreach during hunting season
- Ask hunters using lead ammo to pack out gut pile
- 13A hunt unit added to free ammo program
- Bullets for reloading and muzzle loading bullets added to free ammo program
- International Sportsman's Expo and Outdoor Expo Shooting booths initiated
- Educational flyers posted during hunting season
- Check station hunter surveys to gauge participation

## **2007**

- Condor-lead page in hunting regulations/letters to hunters/condor-lead webpage
- Outreach message simplified, x-rays with lead fragments used
- Condor-lead brochure created
- Condor-lead articles in Arizona sportsmen's publications
- Condor-lead DVD sent to hunters
- Sportsman's expos/lead ammo booths/lead reduction presentations
- Include lead reduction message in all media outreach/press releases
- Free ammunition program
- Follow-up letter sent to hunters who hadn't redeemed coupon for free ammo
- Increased field outreach during hunting season/outreach flyers also posted
- Gut pile raffle for hunters using lead ammo – prizes of Cabela's gift cards
- Check station hunter surveys to gauge participation

## **2008**

- Condor-lead page in hunting regulations/letters & DVD to hunters/condor-lead webpage
- Follow-up letter/increased field outreach/outreach flyers and signs posted
- Free ammunition program/gut pile raffle/check station survey
- Sportsman's expos/lead ammo booths/lead reduction presentations
- In-store non-lead ammo displays in Cabela's, Sportsman's Warehouse, Bass Pro
- Increased lead reduction outreach to small game and varmint hunters
- Survey of general hunting license holders in core condor range
- Peregrine Fund hosts "Lead Conference"
- Increase media coverage of lead reduction efforts

## **2009**

- Condor-lead page in hunting regulations/letters & DVD to hunters/condor-lead webpage
- Follow-up letter/increased field outreach/outreach signs and flyers
- Free ammunition program/gut pile raffle/check station survey
- Free ammo program - ammo amount reduced from two boxes to one
- Unit 13B added to free ammo program
- In-store non-lead ammo displays in Cabela's, Sportsman's Warehouse
- Sportsman's expos/lead ammo booths/lead reduction presentations
- Increased lead reduction outreach to small game/varmint hunters
- Increased lead outreach to Tribal partners
- Worked with Utah Division of Wildlife to implement a lead reduction program for 2010

## **2010**

- Condor-lead page in hunting regulations/letters & DVD to hunters/condor-lead webpage
- Follow-up letter/increased field outreach/outreach signs and flyers
- Free ammunition program/gut pile raffle/check station survey
- In-store non-lead ammo displays in Cabela's, Sportsman's Warehouse
- Sportsman's expos/lead ammo booths/lead reduction presentations

- Targeted lead reduction outreach to schools in core condor range – Arizona and Utah
- Continue outreach with varmint/small game/tribal hunters
- Utah implemented non-lead ammo rebate coupon program

## **2011**

- Condor-lead page in hunting regulations/letters & DVD to hunters/condor-lead webpage
- Follow-up letter/increased field outreach/outreach signs and flyers
- Free ammunition program/gut pile raffle/check station survey
- Sportsman's expos/lead ammo booths/lead reduction presentations
- Full page lead reduction page in spring hunting regulations for varmint hunters
- New condor brochure created including section on lead poisoning
- New non-lead ammunition brochure created using professional graphic designer and marketing ideas
- Utah implemented non-lead ammo rebate coupon program

**Appendix F. Condor publications produced during the third five-year review period (in chronological order)**

- Cade, T.J. 2007. Exposure of California Condors to lead from spent ammunition. *Journal of Wildlife Management* 71(7): 2125-2133. DOI:10.2193/2007-084
- Hunt, W.G., C.N. Parish, S.C. Farry, T.G. Lord, and R. Sieg. 2007. Movements of introduced condors in Arizona in relation to lead exposure. Pages 79-96 in A. Mee, L.S. Hall, and J. Grantham (Eds.) *California Condors in the 21st Century*. American Ornithologists' Union, Washington, D.C., USA and Nuttall Ornithological Club, Cambridge, MA, USA.
- Parish, C.N., W.R. Heinrich, and W.G. Hunt. 2007. Lead exposure, diagnosis, and treatment in California Condors released in Arizona. Pages 97-108 in A. Mee, L.S. Hall, and J. Grantham (Eds.) *California Condors in the 21st Century*. American Ornithologists' Union, Washington, D.C., USA and Nuttall Ornithological Club, Cambridge, MA, USA.
- Sullivan, K., R. Sieg, and C.N. Parish. 2007. Arizona's efforts to reduce lead exposure in California Condors. Pages 109-121 in A. Mee, L.S. Hall, and J. Grantham (Eds.) *California Condors in the 21st Century*. American Ornithologists' Union, Washington, D.C., USA and Nuttall Ornithological Club, Cambridge, MA, USA.
- Woods, C.P., W.R. Heinrich, S.C. Farry, C.N. Parish, S.A.H. Osborn, and T.J. Cade. 2007. Survival and reproduction of California Condors released in Arizona. Pages 57-78 in A. Mee, L.S. Hall, and J. Grantham (Eds.) *California Condors in the 21st Century*. American Ornithologists' Union, Washington, D.C., USA and Nuttall Ornithological Club, Cambridge, MA, USA.
- Green, R.E., W.G. Hunt, C.N. Parish, and I. Newton. 2008. Effectiveness of action to reduce exposure of free-ranging California Condors in Arizona and Utah to Lead from Spent Ammunition. *PLoS ONE* 3(12). DOI:10.1371/journal.pone.0004022
- Bedrosian, B., C.N. Parish, and D. Craighead. 2009. Difference between blood lead level detection techniques: Analysis within and among three techniques and four avian species. Pages 287-288 in R.T. Watson, M. Fuller, M. Pokras, and W.G. Hunt (Eds.) *Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans*. The Peregrine Fund, Boise, Idaho, USA. DOI:10.4080/ilsa.2009.0122
- Chesley, J., P. Reinthal, C.N. Parish, K. Sullivan, and R. Sieg. 2009. Evidence for the source of lead contamination within the California condor. Pages 265 in R.T. Watson, M. Fuller, M. Pokras, and W.G. Hunt (Eds.) *Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans*. The Peregrine Fund, Boise, Idaho, USA. DOI:10.4080/ilsa.2009.0219

- Green, R.E., W.G. Hunt, C.N. Parish, and I. Newton. 2009. Effectiveness of action to reduce exposure of free-ranging California condors in Arizona and Utah to lead from spent ammunition. Pages 240-253 in R.T. Watson, M. Fuller, M. Pokras, and W.G. Hunt (Eds.) *Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans*. The Peregrine Fund, Boise, Idaho, USA. DOI:10.4080/ilsa.2009.0218
- Hunt, W.G., W.A. Burnham, C.N. Parish, K.K. Burnham, B. Mutch, and J.L. Oaks. 2009. Bullet fragments in deer remains: implications for lead exposure in scavengers. Pages 254-258 in R.T. Watson, M. Fuller, M. Pokras, and W.G. Hunt (Eds.) *Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans*. The Peregrine Fund, Boise, Idaho, USA. DOI:10.4080/ilsa.2009.0123
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