

Pinnacles National Monument California Condor Reestablishment – Annual Report 2009



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ON THE COVER

Condor 514 as a 90-day nestling, perching in Nest Cavity SB01, San Benito County, 2009.

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Introduction

During 2009, the Pinnacles National Monument Condor Reestablishment Program monitored the first condor nest that involved a condor originally released from Pinnacles and tracked a flock of 20 condors over a range of approximately 90 miles north to south and 60 miles east to west. One male of the Pinnacles flock, 313, mated with a Ventana Wildlife Society released condor, 303, to fledge condor 514, hatched in the wild from a captive-laid egg placed in the nest at the same time that the wild laid egg was retrieved for the Ventana Wildlife Society eggshell thinning and contaminants study. This was the first condor fledged in the wild as a result of a breeding attempt involving a Pinnacles released condor. Among Pinnacles released condors, there was one mortality in 2009: a three year old female died approximately 6 months after release. Two juveniles from the 2008 cohort were released in January 2009. An additional four juveniles were transferred to the park on July 1 and released from late September through November.

Methods

Condor Monitoring

Throughout the year, Pinnacles biologists track condors in the central California flock primarily from established survey points in the field and using remote sensing techniques, but also using and documenting new field survey points as needed when condors are found in new locations. Priority was given to confirming visual observations of key behaviors such as foraging or breeding, followed by visual observations as health checks, then movement or presence via radio telemetry signals, and GPS locations. In the field, biologists use standardized equipment to track and monitor condors. This equipment includes the following:

- Telemetry receiver: Communication Specialists, Inc. - Model R-1000
- Yagi antenna: AF Andronicus, Inc - Model F165-3FB or Model F164-165-3FB
- Omnidirectional antenna, magnetic mount: PCTEL, no model # available
- Handheld radios: Motorola XTS 3000 – Model H09KDF9PW7BN – and Bendix King Digital – Model DPH5102X
- Handheld GPS: Garmin etrex Vista HCx
- Handheld GPS: Garmin etrex
- Condor GPS transceiver: Microwave Telemetry 45g Argos/GPS solar PTT-100 units for California condors
- Tail mount VHF transmitter: Holohil - Model RI-2CM(12)
- Patagial mount VHF transmitter: Advanced Telemetry Systems (ATS) "micro" - Model A5510
- Patagial mount VHF transmitter: Advanced Telemetry Systems (ATS) "large" - Model Custom2 for adult condor wing mount.
- Blood Lead Test Kit: ESA Magellan Biosciences - Lead Care II Analyzer

Condor biologists also use 20-60x scopes, tripods, 10x42 binoculars, field notebooks, radios, and compasses as standard equipment. Mortality signals or prolonged stationary GPS locations for condors are tracked down with handheld receivers and antennas to confirm dropped tags or presence of sick or deceased condors.

Remote monitoring techniques include GPS transceivers, video, and motion-sensitive still cameras. Approximately 1/3 of the condor flock is monitored remotely using Microwave Telemetry GPS transceivers. Through daily retrieval of CLS America GPS data and incorporation of downloads to an ArcGIS project, and additionally the same data reformatted by USGS for display on Google Earth data, biologists track movements of GPS-tagged birds. Remote video cameras stationed at the captive facility and Pinnacles bait sites record real-time data that biologists review in the Pinnacles Visitor Center office to further document observations of individual birds. Additionally, memory cards from motion-sensitive “game cameras” at bait sites are retrieved each time food is rotated and still photographs are reviewed for presence of birds and bird weights (from scales with perches stationed at the bait sites.)

Data from daily tracking and monitoring are entered into Access databases and Excel spreadsheets. The following data sources represent the most key data generated by Pinnacles condor recovery program staff during 2009:

- **Pendragon FORMS32K.mdb:** This database contains the bulk of the program’s daily monitoring information. Condor observations, including movements, feeding events, breeding behavior, and transmitter detections are entered into this database.
- **PINN_CACO_Handling:** Launched in January 2009 as a comprehensive harbor for all information gathered during handling events, this database contains data on blood draws, injections, transmitter changes, feather sampling, and general health notes.
- **CACO_VideoObservations:** Also created in 2009, this database contains all condor observations gathered from the remote digital video camera system installed in the latter half of 2008. Observations come from four cameras, three of which are located at the captive facility and the fourth at the Hilltop bait station.
- **At-A-Glance Master Lists.xls:** This workbook logs daily detections and captivity periods of individual condors and is the most comprehensive source of daily status information for free-flying birds.

The methods listed above are used to record results from the following types of condor monitoring at Pinnacles:

- Daily population tracking & monitoring at Pinnacles: Biologists track condors in the central California flock within the NPS boundaries at Pinnacles, from survey points at the High Peaks, Grassy Canyon, and North Chalone Peak. This tracking and monitoring is augmented by daily GIS checks to determine movements of GPS-tagged birds, and regular observations of remote video and still camera data. Mortality signals are tracked with handheld receivers and antennas to determine bird status and to recover dropped radio tags.
- Mobile tracking: Biologists track condor locations with the goals of determining movements, feeding events, courtship and breeding behaviors, flock interactions, and mortality signals with four-wheel drive vehicles, handheld receivers, and both vehicle-mounted and handheld antennas. This work is accomplished through all accessible portions of San Benito County, portions of western Fresno County, and eastern Monterey County.

- Nest monitoring: In 2009, biologists monitored the one active nest site from a survey location approximately 700 meters away from the nest cavity, and performed nest entries to retrieve the wild-laid egg, place a captive-laid foster egg, and conduct 30, 60, 90, and 120 day checks on nestling status and to inspect the nest for microtrash.
- Captive monitoring: During trap-up periods and prior to initial releases of young juveniles, biologists monitored captive condor health and interactions from the Grassy Canyon facility and through observations of remote video capture at the Pinnacles Visitor Center.

Documenting and Mitigating Risk Factors

At Pinnacles, the main risk factor threatening the recovery of the central California condor population is lead exposure, predominantly from ammunition fragments in scavenged carcass remains. Other risk factors may include microtrash consumption, West Nile Virus exposure, electrocution at or near power poles, and human interactions. Pinnacles biologists adhere to standardized procedures and established protocols to both study and mitigate these risk factors using the following methods.

- Trapping and processing of condors: In tandem with Ventana Wildlife Society staff, Pinnacles biologists conduct trapping of the entire central California condor flock twice per year to measure lead levels in free-flying condors as well as perform transmitter maintenance and other tissue sampling related to partner research. In 2009, birds with lead above 25 µg/dL on a LeadCare II kit were held for chelation treatment. Removal from the wild for short periods has the additional benefit to condors of reducing their exposure loads over the course of the year. The “Spring” trapping season runs from the end of April through approximately the first week of June and the “Autumn” season runs from the end of August through approximately the first week of October (overlapping with the later half of deer hunting season in our zone.) Staff receive extensive training in handling, bleeding, and inspecting birds both at the Los Angeles (LA) Zoo and from experienced co-workers at Pinnacles that are listed under the Fish & Wildlife permit to perform such duties. Personal protective equipment (PPE) includes eye protection, long-sleeved shirts and pants, closed-toe boots, leather gloves, and latex gloves for inspectors. West Nile Virus vaccinations and boosters are administered on a schedule provided by collaborating veterinarians. Captive condors are held at the Grassy Canyon facility to minimize human interactions. An electrified power pole at the flight pen delivers negative reinforcement to modify condor behavior and discourage them from landing at/near power poles when they are free-flying.
- Emergency response: Condors with high lead levels are treated with calcium EDTA chelations at Pinnacles or transported to the Monterey Avian Exotic Clinic or LA Zoo for radiographs, emergency treatment, or surgeries (e.g. patagial repairs, etc.). Again, only staff with proper training and PPE oversee these emergency response activities.
- Nest entries: During the 2009 condor breeding season, Pinnacles staff managed a series of nest entries at one nest in San Benito County and participated in nest entries organized by Ventana Wildlife Society for the study of coastal nests. Only qualified Pinnacles biologists with rock climbing experience and nestling handling training by the LA Zoo and US Fish & Wildlife Service (USFWS) participate in nest entries. All operations

follow standardized procedures for egg-swapping, and checks of nestlings at ages of 30, 60, 90, and 120 days old. During nest entries PPE includes all appropriate climbing equipment, leather and latex gloves, etc. to insure staff and condor safety. Nestlings are checked for lead levels, general health, vaccinated against West Nile Virus, and nest sites are sifted for microtrash (removed when found) and egg-shell fragments. Annual nest entry trainings are conducted at Pinnacles by qualified instructors, and monthly “mini-trainings” are organized to keep staff experienced with relevant skills. High lead exposure in nestlings leads to evacuations and emergency response procedures as outlined above.

- Research efforts and scientific papers: Pinnacles biologists work closely with researchers at University of California (UC) Santa Cruz to gather scientific data detailing condor responses to environmental risk factors. Blood samples from handlings, emergency responses, and nest entries are sent to UC Santa Cruz as well as to Louisiana State University (LSU) to confirm blood lead levels and to provide a basis for measuring isotopic signatures of lead in condors. Feather samples are sent to UC Santa Cruz to measure lead exposure events in individual condors over time. These data are being used to confirm which environmental lead sources condors are ingesting and how this affects condor health, behavior, and survivorship over time.
- Tracking General Health Indicators: Pinnacles biologists use baiting stations in order to generate regular photographs and video of free-flying condors. Weights are tracked using scales mounted near bait. These scales are customized with integrated perches. Both still photos and video allow biologists to track the weight and general condition of free-flying condors. Pinnacles biologists use “clean” food supplies acquired from regional organic dairies, and place these carcasses approximately bi-weekly at one or two of the established bait stations. These bait stations are the Grassy Canyon flight pen, Hilltop semi-permanent bait site, and Command Post temporary bait site. Established safety requirements include proper PPE, four-wheel drive training, and placement of carcasses by at least two biologists in tandem. Carcass placements are conducted at night to minimize interactions with condors and associations with humans as food suppliers.
- Identifying non-proffered food: Pinnacles biologists respond to observations of non-proffered carcasses – made by local landowners and Pinnacles staff – by promptly contacting landowners and attempting to gain access to identify carcasses. When possible, sub-samples or the entire carcass are retrieved. Calves or carcasses not believed to be potential lead sources are not retrieved. Any lead fragments found in non-proffered carcasses are sampled and sent to UC Santa Cruz for further analysis.

Personnel

In 2009, the Pinnacles Condor Program staff was comprised of four full-time, all-year employees (one program manager, two crew leaders, and one field technician); two full-time, 4-6 month employees (lead outreach coordinator and raptor biologist); two full-time, all-year interns; and many volunteers.

In 2009, 15 people and a multimedia class donated their time to the Pinnacles Condor Program. 2009 marked the beginning of a long-term volunteer corps. Recruitment began in the fall and the first group attended an orientation in November. Eight people returned later that month and in

December for their first on-site days of training. These volunteers, in addition to seven others, contributed 122 volunteer hours. With the initiation of a volunteer corps, the Condor Program hopes to increase tracking and interpretation capabilities.

Monitoring

Population Status

At the beginning of 2009, there were 20 condors managed by Pinnacles National Monument in the Central California flock - 13 males and 7 females. The one fledgling of the year involving a Pinnacles parent, Condor 514, a male, hatched in April and fledged in October. The nest site was in central San Benito County in the Diablo Mountains. Two juveniles were released to the wild in January as we completed release of the 2008 cohort. Four additional captive-reared juveniles were transferred to the park on July 1. Two males and one female from Boise and one female from Oregon were released beginning at the end of September. All four were “free-flying” by late November. One juvenile died approximately six months after release. One nest that included a parent condor originally released at Pinnacles successfully fledged condor 514, despite the death of the foster dam, 303 (a Ventana Wildlife Society managed bird), in October. Due to the gain of six captive-reared birds, loss of one to mortality, and gain of one free-flying wild-fledged bird, by the end of 2009, Pinnacles National Monument managed 26 “free-flying” condors - 17 males and 9 females.

Reproduction

One nesting effort involving Pinnacles-released condors was documented during the 2009 season.

313-303 at Nest Cavity SB01. (Nest site name derived from the county, San Benito, and “01” for first nesting effort within it.)

The first condor nest documented in San Benito County in over 100 years was confirmed at a cliff cavity on a private ranch approximately 12.5 miles east of the condor release site at Pinnacles National Monument. The nesting pair was comprised of 313 – a five-year old Pinnacles male – and 303 – a five-year old VWS female. (Note that adult ages are listed for time of egg laying. Each bird turned six in the spring.) Courtship between the two condors was observed through late winter, and egg incubation was confirmed at the nest in mid-March. A nest entry was performed at the site to retrieve the wild-laid egg, which was found to be fertile. (The wild-laid egg was transferred to LA Zoo, successfully hatched in captivity, but was killed by foster parents.) A second nest entry was conducted to swap in a pipping egg, and the hatching of 514 marked the first condor nestling hatched in San Benito County and involving a Pinnacles-released breeding adult during the recovery program. On subsequent nest entries 514 was documented in good health, and limited microtrash (primarily small pieces of PVC plastic) was removed from the site. In early October, the adult female 303 was observed perching lethargically with a limp wing and limited mobility for multiple days. On October 8, 303 was trapped after continuing observations of decreasing health and mobility. She was transferred to the Monterey Avian Clinic and a medium-sized radio-opaque fragment was found in her GI tract. 303 was then transferred to the LA Zoo and treated for acute lead poisoning. Condor 313

continued to feed 514, and 514 fledged successfully on October 17, 2009. Despite concerted attempts by condor staff at the LA Zoo to lower her lead levels, 303 died on October 23, 2009.

Mortalities

422 – California Condor 422 was recovered dead from the field on July 12, 2009. Although 12 July 2009 has been noted as the date of death on the necropsy report, actual date of death is unknown, between the last telemetry signal on June 28, 2009 and carcass recovery on July 12, 2009. Necropsy by Dr. A. Pessier of the Zoological Society of San Diego was not able to assign a cause of death due to the decomposed state of the carcass. Bone and feather samples were collected and transferred to the Smith Laboratory at UC Santa Cruz for further analysis. Results of this analysis suggest that 422 died of lead toxicosis. 422 was a three year old female, hatched on May 14, 2006 and released to the wild from Pinnacles National Monument on January 4, 2009.

In April, 422 was captured for a routine health check and was found to have an elevated lead level of 44 µg/dL. She was given a round of chelations and was released with a final blood lead level of 18 µg/dL. In early June, she was trapped again and her blood level was 6 µg/dL, so she was released. By late June, after multiple unsuccessful attempts to locate 422 with radio telemetry by Pinnacles staff, a telemetry flight was scheduled. The flight located signals for both of 422's transmitters, one in mortality mode and one in normal mode. The coordinates from this flight were used to identify the landowner and obtain access to recover the carcass.

This case highlights the difficulty of tracking condors over rugged terrain and private property from limited locations on public roads. Although the carcass was found less than 1.5 miles from a public highway, several attempts to obtain signals for 422 from this point were unsuccessful. This case also highlights the importance of education and outreach efforts for communities within the range of condors and the importance of fostering working relationships with local landowners. The issue with one transmitter not switching to mortality mode presents a potential problem with condors that carry only one transmitter. Although a bird missing for an extended period of time warrants attention, receiving a mortality signal heightens the priority of locating a bird or dropped or malfunctioning transmitter.

522 (PN0109) – The wild-laid egg from the San Benito nest was transferred to the LA Zoo and successfully hatched in an artificial nest with a foster parent, but later died of trauma caused by a foster parent.

Disease Surveillance

West Nile Virus - The only disease that was routinely monitored and vaccinated for in 2009 was West Nile Virus. Nestlings are typically vaccinated at 30 and 90 days old. Blood samples are taken and tested at least once per year for every condor in the flock. When titer results indicate little resistance to the virus, a booster shot is administered.

ALAD Inhibition – In 2009 Pinnacles National Monument provided blood samples to collaborators at UC Santa Cruz for analyses of ALAD enzyme activity. This work established

that condor ALAD activity is highly sensitive to inhibition by lead. Research results will be forthcoming in a future paper by Drs. Finkelstien and Smith.

Case Studies

Condors 286, 375, 400, and 401 – Shooting Event(s)

These four condors were all involved in at least one shooting incident that left lead shotgun pellets embedded in their tissues. Although location and date of the one or more incidents are not known, subsequent analysis of the pellets by Myra Finkelstein at UC Santa Cruz confirmed that the pellets were lead and that the isotopic signature matches for all the pellets. This suggests that all the birds were targeted at one time or returned to the same location and were fired upon at separate times but by the same batch of ammunition.

All of these condors were discovered to have pellets in their tissues after they were taken to the LA Zoo for lead poisoning treatment. Standard procedure at the zoo for a condor with a high blood lead level is to take a radiograph. It was the production of these radiographs that led to discovery of the pellets. Because lead pellets embedded in muscle tissue are not believed to cause the level of lead exposure documented in these condors, toxicologists believe that the ingested lead rather than intramuscular lead pellets caused their condition. Field observations of these condors indicate that they were able to continue flying after being shot. Condor 286 had exhibited concerning behavior and field staff specifically targeted trapping that bird due to a drop in rank, but field staff did not suspect that any of the birds had been shot before they were radiographed.

On March 4, 2009, Condor 286 was trapped and found to have extreme lead poisoning. When he was taken to the LA Zoo, 15 shotgun pellets were found in his tissues. This condor was in the advanced stages of lead poisoning and did not recover. A pellet was removed posthumously and sent to UC Santa Cruz for analysis.

Only three weeks after finding the pellets in 286, on March 26, 2009, Condor 375 was found to also have pellets lodged in her tissues. Two pellets were in her wing and a third was in her lower abdominal area. One pellet was surgically removed and sent to UC Santa Cruz.

On October 30, 2009, Condor 401 was found to have lead poisoning. In his radiograph, five pellets were found in his tissues, one in the neck, two in the left wing, and two in the upper body. One pellet was surgically removed from his wing and sent to UC Santa Cruz.

Subsequently, on September 29, 2010, Condor 400 was radiographed and a single pellet was found in her wing. It was surgically removed and sent to UC Santa Cruz.

After the first two condors were found to have been shot, an investigation into the case was opened by USFWS. Additionally, a private investigator was hired by a non-profit organization to look into the matter. The private investigation was covered in an article by the New York Times. Due to the fact that shotgun pellets can remain lodged in tissues for years and that Pinnacles and Ventana Wildlife Society staff do not routinely radiograph condors, it is possible that more condors with embedded shot will be located.

Condor 303 – Lead Poisoning of a Breeding Female

This female condor hatched on April 22, 2003 at San Diego Wild Animal Park. She was puppet-reared and then released by VWS at Big Sur on October 7, 2004. Although not tracked as a Pinnacles-released bird, 303 along with 313 formed the first breeding pair of California condors documented in San Benito County in over 100 years (see Nesting section). 303 died in captivity on October 23, 2009 after being evacuated due to clinical signs of high blood lead levels. In addition to nesting and mortality details, 303 was significant in that several feathers were sampled from her during handling events in the prior 18 months. These feather samples were tested for isotopic analysis by Drs. Myra Finkelstein and Don Smith at UC Santa Cruz, and provided the most extensive lead exposure history in a single bird yet. Exposure levels were documented over a time span covering nearly the entire breeding season and until death in October.

Management

Hazing

In 2009 there were eleven hazing events. These events involved eleven individual birds, with four birds being hazed twice during the year. Six of the hazing events took place at Grime's Point in Big Sur, CA. One event took place at the Visitor's Lunch Spot in the High Peaks (HP) at Pinnacles National Monument. For four of the events the location was in Big Sur, but the exact location was not specified. The birds hazed during 2009 were: 306 (Grime's Pt, Unknown Big Sur), 312 (Grime's Pt), 470 (Grime's Pt), 310 (Grime's Pt twice), 340 (HP, Grime's Pt), 438 (unknown Big Sur, Grime's Pt), 317 (Hwy 1), 400 (Grime's Pt), 351 (Grime's Pt), 401 (Grime's Pt), and 418 (unknown Big Sur). None of the events took more than one attempt to haze the birds away. The methods of hazing noted were sprinklers and running at the bird while clapping hands.

Proffered Baiting

We use 3 distinct proffered bait stations at Pinnacles National Monument. One site is at our Facility flight pen where all of our trapping for health checks occur. The other two are on nearby hilltops (Hilltop and Command Post). Command Post is a temporary site used as an intermediary between the Facility and Hilltop for newly released condors. The majority of carcasses that we feed out are calves that are obtained through partnerships with organic dairies in Modesto, CA. In 2009, we fed out a minimum of 100 calves, 3 bags of rats, 2 sheep, and 1 horse. Insufficient records were kept to determine a more precise number.

Surgeries

In 2009, two condors had patagial hole surgeries performed and one condor had a shotgun pellet removed from his wing tissue. Condor 312 had both holes sutured shut and 340 had the left patagial hole closed. Both surgeries were performed at the LA Zoo and both condors recovered well. Condor 401 had one shotgun pellet surgically removed from his wing. This pellet was sent to UC Santa Cruz for further testing.

Chelations

In 2009, 17 different Pinnacles condors were treated for elevated blood lead levels. Of those, five were treated on multiple occasions. Eight condors were treated at Pinnacles for a total of 12 exposure events and 12 condors were treated at the LA Zoo for a total of 13 exposure events. Additionally, some Ventana Wildlife Society managed birds with elevated lead were given the first chelation shot here at Pinnacles before transfer to the LA Zoo for the full series of treatments, but are not included in these summary numbers.

In 2009 field biologists used the threshold of a blood lead value of 25 µg/dL or greater on a LeadCare II Analyzer to determine initiating chelation. This threshold was the same for at least the prior two years, although LeadCare I Analyzers were used until September of 2008. Typically if the value is greater than 65 µg/dL (“High” on the Analyzer), a condor will be transported to the LA Zoo for treatment. Exceptions to the latter guideline may take place if other medical or logistical considerations suggest transport at lower thresholds is suitable.

Radiographs

In 2009 a total of 55 radiographs were taken of 17 condors from 21 separate events. Four of these events resulted in condors being radiographed at multiple locations. Nineteen of these events were for lead exposure. One was due to a condor observed to be lethargic while in captivity during a routine trapping event. One was due to a patagial repair. In 2009 we assisted three clinics to conduct radiographs: the Health Center at the LA Zoo, the Avian and Exotic Clinic of the Monterey Peninsula and the Animal Care Center in Morgan Hill, CA. Radiography revealed 2 condors to have fragments in their digestive tracts. These fragments were small and not recovered. Radiography also revealed 5 pellets imbedded in the body of one condor (401 – 1 in the neck, 2 in the left wing and 2 in the upper body). One of these pellets was recovered by the LA Zoo and transferred to UC Santa Cruz for analysis.

West Nile Virus

In 2009, eight condors were vaccinated for West Nile Virus at Pinnacles National Monument. These included both Pinnacles and Ventana Wildlife Society managed birds: 219, 231, 242, 303, 311, 317, 375, 444, 448, and 481. Additionally, two vaccinations were administered to condor 514 as a nestling in a wild nest. Pinnacles also has records of three other Pinnacles managed birds being vaccinated at either the LA Zoo or in Big Sur: 335, 340, and 345.

Research

UC Santa Cruz – Feather and Blood Pb Isotopic Fingerprinting

In 2009, Pinnacles National Monument continued collaboration with Dr. Don Smith’s Environmental Toxicology laboratory at UC Santa Cruz on projects analyzing blood and feather samples for Pb concentration and isotopic ratios. Whole blood was collected in tan top Vacutainers and feather vanes sampled along the margin of primary feathers were gathered and transferred to the university for future analysis.

Specific attention was paid this year to opportunities to sample multiple feathers from a single bird that would represent different but overlapping time periods. Such sampling would result in the ability to review lead exposure histories spanning six or more months. Because Pinnacles staff measured and marked growing feathers on condor 303 each time she was handled over the course of the year, at the time of mortality in October we were able to assemble three different feathers that represented a growth timeline from the spring until the time of death. Additionally, multiple feathers were measured and marked on condor 422, and when that condor died, feather samples representing nearly its entire time in the wild, almost six months, were gathered and provided to the Environmental Toxicology laboratory at UC Santa Cruz. Finally, two feathers that grew in sequence were sampled from condor 112 and additional feathers were marked that could allow for future analysis of a significant time window of the condor's life. Serial sampling of sequential grown feathers represents an opportunity to significantly expand our understanding of lead exposure histories in free-flying condors.

Recovery Program Lead Sampling

Field biologists at Pinnacles National Monument collaborated with managers at Ventana Wildlife Society to establish a coordinated biennial blood sampling of condors. Spring trapping initiates in late April and ends once 100% of the flock has been trapped. The "Autumn" trapping cycle began in late August, two weeks after the opening of deer season. Additional blood samples were sometimes generated at other times of the year when a condor is trapped for transmitter maintenance or other management issues.

Blood samples were sent for analyses to Louisiana State University (a few were sent to the UC Davis California Animal Health and Food Safety Laboratory) for generation of higher quality values than are possible to generate with field LeadCare kits.

Results of these analyses were provided to the USFWS for inclusion in a summary report for the entire state of California and are therefore not included here.

Trash in Condor Nests

During all condor nest entries, a visual inspection is made of the nest surface and the substrate is sifted in order to document the presence of anthropogenic materials. Nestlings are also palpated to identify foreign material when possible. In 2009, the amount of trash found in one condor nest was relatively marginal in comparison to nests managed by other release sites that have led to trash impaction in nestling. No data summaries have taken place, since by the end of 2009, only one nest had been investigated by the Pinnacles program.

Chelation Effectiveness

Laboratory Pb values were generated for blood drawn after two and after four chelation treatments in order to contribute to a future review of chelation effectiveness.

Outreach

The Blue Ribbon Panel identified lead outreach as one of the most important tools that can positively impact condor recovery throughout California. To meet this objective, Pinnacles staff employ varied outreach funds and efforts in attempts to educate diverse public groups and affect policy decisions on the impacts of lead on condors, other wildlife, human safety, and the benefits of removing lead from the landscape.

Targeted Outreach Efforts

The National Park Service continued its collaboration with The Institute for Wildlife Studies (IWS), funded through a major National Fish and Wildlife Fund grant, to engage both national and regional audiences in a dialog about the impacts on lead ammunition on scavenging wildlife and how the hunting and shooting community can continue to improve health of hunting landscapes. Jake Theryl held the IWS outreach coordinator position and focused most of his outreach efforts within a 50-mile radius surrounding Pinnacles National Monument. Efforts included shooting demonstration events for a general audience, small scale invitational events on local ranches, a limited lead-for-copper exchange program, presentations to local shooting and sportsmen organizations, and distribution of brochures and other materials at country fairs and other public events.

Please refer to the IWS summary report for more extensive details on their outreach program.

Additionally, impromptu outreach efforts are regularly undertaken by Pinnacles field staff while mobile tracking. Each staff member keeps a kit of brochures and binder of key images to assist discussions with individuals that stop on the side of the highway to discuss the program with field personnel.

General Community Outreach

Pinnacles staff presented to local high schools and community groups regarding recovery efforts several times over the course of the year. A highlight of general outreach was work with a multimedia class from San Benito High School in Hollister, California. The class took on a group project to produce six public service announcements highlighting threats to condors. There were approximately 20 students who worked closely with condor crew members to learn about threats to condors and get feedback for development of messages they crafted for the videos. These were later aired on public television and can be found posted on YouTube. One student video was highlighted at the autumn International Wildlife Film Festival in Missoula, Montana.

Recommendations

- Expansion of a lead awareness campaign will be critical to increasing awareness of this key issue to both key constituencies and the general public.
- Review of Recovery Program protocols between all condor release sites to ensure data is collected in a consistent manner will facilitate broader research questions.
- A greater emphasis on research, and thereby publication of papers in respected journals, will better inform national level administrators and policy makers of the current status of

condor recovery efforts. Management efforts on their own will not recover the species to a self-sustaining flock in the wild.

- Continued collaboration between sites to train nest entry personnel will ensure safe and effective research.

Acknowledgements

We are grateful to all of our many collaborators and partners that continually aid us in our work to restore this species. We would especially like to thank staff at UC Santa Cruz, IWS, CDFG, Ventana Wildlife Society, USFWS, Dr. Amy Wells and the staff at the Avian and Exotic Clinic of Monterey Peninsula, and the Bureau of Land Management. Field efforts to release captive-reared condors would not be possible without the exhaustive efforts of the LA Zoo, San Diego Zoo Safari Park, Peregrine Fund's World Center for Birds of Prey, and the Oregon Zoo. Semiannual trapping and the care of condors in temporary captivity would not be possible without the organic dairy farmers that provide calf carcasses used as bait and food. These farmers include John Boere, John Knutson, and Frank Coelho. Pinnacles Partnership has also been an immense help to our local education and outreach efforts. Finally, we cannot thank our volunteers and interns enough for their indispensable support. These contributors are listed by name below.

Volunteers

Rachel Brown, Steve Chidester, Rich Enroth, Leann Falsey, Howard Higley, Karen Hotopp, Jennie Jones, Mary Maio and her multimedia class, Dana Roberts, Loni Silver, Camilla Simon, Joseph Smith, Melanie Stoner, Mike Tyner, and Dylan Wilson.

Exchange Biologist from Argentina
Carolina Gargiulo

Interns

In 2009, there were two full-time interns throughout the year. The following individuals split the year: Jessica Auer, Wendy Lanier, Laura Mendenhall, and Erica Uhor.