



Pinnacles National Monument California Condor Reestablishment – Annual Report 2011



Contributors:

Daniel George, Program Manager
Alacia Welch, Field Crew Leader
Scott Scherbinski, Field Crew Leader
Gavin Emmons, Biologist
Jessica Auer, Biological Technician
Jennie Jones, Biological Technician

National Park Service
Pinnacles National Monument
5000 Highway 146
Paicines, CA 95043

Final Version:

Report to the US Fish and Wildlife Service under Endangered Species Recovery Permit
TE157291-1

ON THE COVER

Condor 588 takes his first flight in the wild on September 24, 2011 NPS Photo by Paul Johnson

Please cite this publication as:

George, D., et al. 2013. Pinnacles National Monument California Condor Reestablishment –
Annual Report 2011. Pinnacles National Monument, National Park Service, Paicines, California.

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, Institute for Wildlife Studies, California Department of Fish and Game, UC Davis, Ventana Wildlife Society, US Fish and Wildlife Service, Dr. Amy Wells and the staff at the Avian and Exotic Clinic of the 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 Los Angeles 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 to use as bait and food. These farmers include John Boere, John Knutson, and Frank Coelho. Additional thanks go out to Bill James for assistance with specialized IT needs associated with remote video monitoring. 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

Chris Allen, Karen Alroy, Joseph Belli, David Bocian, Joe Burnett, Steve Chidester, Mike Clark, Julie Clements, Graham Crawford, Chandra David, Timothy Fuller, Elise Hinger, Jacob Isaacs, Eric Krussman, Hisako Mutlow, Adrian Mutlow, Richard Neidhardt, Matt Peters Paul Portschy, Devii Rao, Jason Robus, Peter Szydlowski, Jenny Thuele, Maria Trenary, Linnea VonAhn, Rachel Wells, Amy Wells, and Ted Wilbur.

Interns

Eric Falquist, Timothy Fuller, Jennie Jones, Nathan Melling, and Rachel Roberts

Table of Contents

Introduction	1
<i>Summary</i>	1
<i>Objectives</i>	1
Methods	1
<i>Condor Monitoring</i>	1
<i>Documenting and Mitigating Risk Factors</i>	3
<i>Captive-bred Releases</i>	5
<i>Personnel</i>	5
<i>Safe Work Practices</i>	5
Results and Discussion	6
Monitoring	6
<i>Population Status</i>	6
<i>Captive-bred Releases</i>	6
<i>Reproduction</i>	6
<i>Mortalities</i>	8
<i>Case Studies</i>	8
Management	9
<i>Hazing</i>	9
<i>Proffered Baiting</i>	9
<i>Surgeries</i>	10
<i>Chelations</i>	10
<i>Radiographs</i>	10
<i>Vaccinations</i>	10
<i>Fire Tower Mitigation</i>	11
Research	13
<i>Feather and Blood Pb Isotopic Fingerprinting</i>	13
<i>Recovery Program Lead Sampling</i>	13
<i>Trash in Condor Nests</i>	14
<i>Feather Growth Rates</i>	14
<i>Chelation Effectiveness</i>	14
Outreach	14
<i>Targeted Outreach Efforts</i>	15
<i>General Community Outreach</i>	15
Safety	15
Recommendations	16

Introduction

Summary

During the 2011 calendar year, the Pinnacles National Monument Condor Reestablishment Program managed a flock of 34 condors, tracking the birds over a range of approximately 90 miles north to south and 60 miles east to west. The park released an additional four captive-reared condors to the wild in the autumn and tracked two nests that involved condors originally released from Pinnacles. One male of the Pinnacles flock, 313, mated with a Ventana Wildlife Society released condor, 375, in their first attempt to nest together. Condor 313 re-paired after his previous mate died of lead poisoning in 2009. This new pairing proved successful and they fledged female condor 598 from a foster egg. Condor 595, the nestling from the other breeding pair, 317 and 318, was evacuated from the park after it was identified to have a traumatic wing injury from an unknown event in the wild. Among Pinnacles released condors, there were no mortalities in 2011. A significant amount monitoring was conducted at a fire lookout tower located within the park to dissuade condors from spending time at this site.

Objectives

Project objectives include:

- 1) monitoring central California condors foraging behavior and population trend, including nesting and reproduction;
- 2) detecting mortalities so cause of death can be determined;
- 3) managing threats to condors through treatment;
- 4) increasing public awareness of threats to condor recovery; and
- 5) conducting cooperative research to aid condor recovery.

Methods

Condor Monitoring

Throughout the year, Pinnacles biologists tracked condors in the central California flock primarily from established survey points in the field, 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, movement or presence via radio telemetry signals, and GPS locations. Biologists used standardized equipment to track and monitor condors including:

- 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
- Handheld GPS: Trimble Juno SB

- Condor GPS transmitter: 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
- Patagial mount VHF solar transmitter: Merlin Systems, Inc. – Model “Condor Wingmount”
- Blood Lead Test Kit: ESA Magellan Biosciences - Lead Care I & II Analyzers
- Standard field equipment: 20-60x scopes, tripods, 10x42 binoculars, field notebooks, communication radios, and compasses

Remote monitoring techniques included GPS transmitters, video, and motion-sensitive still cameras. Approximately one third of the condor flock was monitored remotely using Microwave Telemetry GPS. Biologists tracked movements of GPS-tagged birds through daily retrieval of CLS America GPS data and inputting those downloads to an ArcGIS project, and using the same data reformatted by USGS for display on Google Earth. Remote video cameras stationed at the captive facility and Pinnacles bait sites recorded real-time data that biologists reviewed at a central computer to observe individual birds. Each time food was placed at a bait station, memory cards from motion-sensitive cameras were retrieved and the photographs were reviewed for presence of birds and bird weights (from scales with perches that were stationed at the bait sites.)

Data from daily tracking and monitoring were entered into Microsoft Access databases and Excel spreadsheets. Pinnacles condor recovery program staff used the following Microsoft Access databases:

- PINN_CACO_Tracking: This database contains the bulk of the program’s activities and replaced a former Pendragon database in January 2010. All condor observations, including movements, feeding events, roost locations, breeding behavior, and transmitter detections were entered into this database. In addition, trapping summary details, captive condor observations, hazing events, and transfers to other facilities or sites were entered. Finally, interpretive contacts, landowner contacts, carcass placements, carcass collection runs, and any high priority field notes were entered.
- PINN_CACO_Handling: This database contains all of the information collected when condors were handled and has all data since the beginning of the Pinnacles program. It includes general health notes, blood draws, injections, transmitter changes, and feather sampling data.
- PINN_CACO_Still_Photos: This database contains all condor observations gathered from remote still camera photographs and was created in the fall of 2010.
- CACO_VideoObservations: This database contains all condor observations gathered from the remote digital video camera system and was created in 2009. Observations were from four cameras, three of which were located at the captive facility and the fourth at the Hilltop bait station.

Monitoring data were collected through:

Daily population tracking and monitoring at Pinnacles: Biologists tracked 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 was augmented by daily GIS checks to determine movements of GPS-tagged birds and regular observations of remote video and still camera data. Mortality signals or prolonged stationary GPS locations for condors were tracked by walking to the signal to confirm dropped tags or presence of sick or deceased condors.

Mobile tracking: Biologists use four-wheel drive vehicles, handheld receivers, and vehicle-mounted and handheld antennas to track condor locations to determine movements, feeding events, courtship and breeding behaviors, flock interactions, and mortality signals. This was conducted throughout accessible areas of San Benito County and portions of western Fresno and eastern Monterey Counties.

Nest monitoring: Biologists monitored active nest sites from survey locations 300-800 meters from the nest depending on topography, and performed nest entries when feasible to confirm egg viability, hatching, nestling age, general health and behavioral interactions, adult-nestling feeding events, and fledging of young.

Captive monitoring: During handling 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.

Documenting and Mitigating Risk Factors

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 followed standard procedures and established protocols to study and mitigate these risk factors using the following methods.

Trapping and processing of condors: In tandem with Ventana Wildlife Society (VWS) staff, Pinnacles biologists conducted trapping targeting the entire central California condor flock twice per year to 1) measure lead levels in free-flying condors, 2) maintain transmitters, and 3) conduct other biological sampling related to partner research. In 2011, birds were held for chelation treatment with blood lead levels above 35µg/dL or greater on a LeadCare Analyzer. This threshold was increased from previous years' threshold of 25µg/dL or greater upon recommendation by the Recovery Program veterinarians reported by Dr. Curtis Eng of the LA Zoo at the Field Team Meeting. The "Spring" trapping season was from late April through approximately the first week of June and the "Autumn" season was from late August through approximately the first week of October. Autumn trapping overlaps with the latter half of deer hunting season in this area. Ideally, both trapping periods would continue until the entire flock was trapped. However, if some birds did not return to the park for several weeks, trapping ended once 90% of the flock had been trapped. Removing condors from the wild for short periods has the additional benefit of reducing condor exposure loads over the course of the year. Staff received extensive training in handling, bleeding, and inspecting birds at the LA Zoo and from experienced co-workers listed on the Pinnacles USFWS recovery permit (TE157291-1) to

perform these tasks. Personal protective equipment (PPE) included eye protection, long-sleeved shirts and pants, closed-toe boots, leather gloves, and latex gloves for inspectors. Captive condors were held at the Grassy Canyon facility to minimize human interactions. An electrified power pole (at very low amperage) at the flight pen is stationed to deliver negative reinforcement to modify condor behavior and discourage them from landing at/near power poles when they are free-flying.

Disease surveillance: We administered West Nile Virus vaccinations and boosters on a schedule provided by collaborating veterinarians. In 2011, the protocol for surveying the prevalence of West Nile Virus in California condors was updated by the Recovery Program. Previously, each condor was tested every year for a titer response and those with a low response were given vaccinations. The new protocol is to vaccinate every condor every autumn and to stop taking blood for titer response testing.

Emergency response: Condors with high lead levels were treated with calcium EDTA chelations at Pinnacles or were transported to the Monterey Avian Exotic Clinic or the LA Zoo for radiographs and emergency treatment. These facilities performed other health assessments or surgeries (e.g. patagial repairs, etc.) as needed. Only permitted staff with proper training and PPE assisted with these emergency response activities.

Nest entries: During the condor breeding season, active nest sites were entered by qualified Pinnacles biologists followed standard procedures for egg-swapping and nestlings checks at ages: 30, 60, 90, and 120 days old. During nest entries PPE included all appropriate climbing equipment, leather and latex gloves, etc. to ensure staff and condor safety. Nestlings were checked for lead levels, general health, and vaccinated against West Nile Virus. Nest sites were sifted for egg-shell fragments and microtrash (which was removed when found). Nest entry trainings were conducted at Pinnacles by qualified biologists, and monthly “mini-trainings” were organized to keep staff experienced with relevant skills. High lead exposure or obvious illness or traumatic injuries of nestlings resulted in evacuations and the emergency response procedures outlined above.

Research efforts and scientific papers: Pinnacles biologists worked closely with researchers at University of California (UC) Davis and UC Santa Cruz to gather scientific data detailing condor responses to environmental risk factors. Blood samples from handlings, emergency responses, and nest entries were sent to both universities to confirm blood lead levels and to measure isotopic signatures of lead in condors. Feather samples were sent to UC Santa Cruz to measure lead exposure events in individual condors over time. These data were being used to confirm which environmental lead sources condors were ingesting and how this affects condor health, behavior, and survivorship over time.

Tracking General Health Indicators: Pinnacles biologists used bait stations to generate regular photographs and video of free-flying condors. Scales mounted near bait with customized with integrated perches and cameras to record the weight when a condor uses the perch. Biologists used “clean” food supplies acquired from regional organic dairies and placed carcasses approximately bi-weekly at one or two established bait stations. Bait stations included: the Grassy Canyon flight pen, Hilltop semi-permanent bait site, and Command Post temporary bait

site. Established safety requirements included proper PPE, four-wheel drive training, and placement of carcasses by at least two biologists in tandem. Carcass placements were conducted at night to minimize interactions with condors and associations with humans as food suppliers.

Identifying non-proffered food: When local land owners or other Pinnacles staff observed non-proffered carcasses, biologists promptly contacted landowners for access to identify the carcass. When possible, samples or the entire carcass were retrieved if it was suspected as a potential source of lead. Any lead fragments found in non-proffered carcasses were sampled and sent to UC Santa Cruz for further analysis.

Captive-bred Releases

Captive-bred condors were released using a ‘soft release’ method. This means that birds in the flight pen could access another open door leading to a ‘drop in trap’ (DIT). The DIT door is left open to the flight pen and closed to the outside until the desired condor enters the trap. Then the inside door is closed and the outer door is opened, allowing the select condor to leave when it chooses. Once a condor was released, it was monitored throughout each day until it was seen regularly roosting in appropriate locations.

Personnel

In 2011, the Pinnacles Condor Program staff was comprised of four full-time, year round employees (one program manager, two crew leaders, and one field technician) and two full-time, seasonal employees (a lead outreach coordinator and a raptor biologist). The program had over 20 volunteers that put in a total of 1,573 hours. There were five interns who contributed over 5,000 hours. Volunteers and interns assisted in tracking, trapping, field observations, carcass placements, and a wide variety of logistical tasks that supported management of the species. They performed all these tasks with only a small monetary incentive. The Condor Program could not have accomplished all of its goals and objectives without the significant efforts and dedication of these individuals.

Safe Work Practices

Safety is paramount to any successful program and the Pinnacles Condor Program implemented safe work practices across all aspects of the program. Our goal was to have no injuries or incidents that compromised the crew’s safety. By ensuring safe work practices through PPE, skills training, monthly safety meetings, and awareness, we protected our employees, interns, and volunteers. PPE included gloves, protective clothing, closed toe footwear, and protective eyewear during any condor handling and working off-trail required snake chaps. We also used PPE (rubber gloves, long pants, long sleeves, and closed toe shoes) for any carcass handling. Formal monthly safety meetings were supplemented by informal safety meetings among the crew, especially when environmental conditions presented hazardous conditions. We had regular ropes training for personnel who conducted nest entries, which included familiarity with all related climbing and safety equipment. Before any crew member handled condors, handling skills training was conducted at the LA Zoo and during handling at the Pinnacles facility when experienced, permitted handlers were present. Training on 4-wheel drive vehicles was required before any crew member drove unpaved park roads. Finally, during evening work and nest

entries, we required two crew members to work together. All crew members were instructed to put personal safety above project needs.

Results and Discussion

Monitoring

Population Status

At the beginning of 2011, there were 29 condors managed by Pinnacles National Monument in the central California flock: 17 males and 12 females. Condor 598 (a female) was the one fledgling in 2011 with a Pinnacles parent. This wild fledged bird hatched in April and fledged in September. The nest site was at a private ranch in San Benito County. Three juvenile males from The Peregrine Fund World Center for Birds of Prey in Boise ID were transferred to Pinnacles in July. A fourth juvenile, Condor 550, a female, hatched in the wild at Pinnacles in 2010 and reared at the LA Zoo, was transferred back to Pinnacles in August 2011. Releases of these four juveniles began at the end of September and all four were “free-flying” by the end of October. With the four captive-reared birds released, and one wild-fledged chick, Pinnacles National Monument managed 34 “free-flying” condors: 20 males and 14 females by the end of 2011.

Captive-bred Releases

During September and October crew members released four captive-bred juvenile condors. The drop-in-trap (DIT) was used for all four releases. Three of the juveniles, 564, 588, and 589 (all males) were hatched at the World Center for Birds of Prey. They were transferred from Boise in July, placed in the flight pen with an adult mentor bird, and allowed to acclimate to the area and our flock. In August, female Condor 550 joined the other juveniles in the pen.

The first release (588) occurred during our “Condor Comeback Celebration” on September 24 and allowed visitors to watch the release via video monitors. Two days later, a second condor (589) was released. Both of these birds remained close to the facility and proffered feeding sites, each spending at least one night in the chamise around the facility. In mid-October they made it to the High Peaks. On that same day, 564 was released, and stayed in the general vicinity of the facility. Lastly, 550 was released at the end of October. She immediately perched in a nearby tree and fed at a proffered feeding site away from the facility the following day. In early November, 564, 588, and 589 began venturing outside the park, while 550 remained in the area of the facility.

Reproduction

Two nesting efforts involving Pinnacles-released condors were documented during the 2011 season.

318-317 at Nest Cavity MAT3 in Pinnacles

The second California condor nest within the boundaries of Pinnacles National Monument was confirmed at a rock cavity in the Mating Rocks formation. The nesting pair of VWS male 318 and PINN female 317 was established in 2010 when their nesting attempt at Resurrection Wall

failed due to lead toxicosis. Courtship behavior was seen throughout the winter and egg incubation was confirmed in mid-February with a dummy egg being placed in early March. The wild laid egg (599) from this pair was fertile and was eventually placed and hatched in a wild nest in Southern California. A pipping egg was brought from the LA Zoo in late March. The hatch date of the foster egg (595) was March 24. Condor 595 (a female) was monitored through regular nest entries at the 30, 60, 90, and 120-days, had low blood lead levels, and developed at a healthy rate. However, as detailed in a case study below, 595 was later evacuated from the Mating Rocks nest and taken to the LA Zoo for further care. Because of this, the 318/317 nest for 2011 failed.

313-375 at Nest Cavity SB01 at RS Bar Guest Ranch on Rock Springs Peak, San Benito Co.

In 2011, Condor 313 (a PINN-released male) and 375 (a VWS-released female) nested on a cliff ledge located on private property near Pinnacles. This nest site was previously used by Condors 303 and 313 in a prior year. Condor 313 paired with 375 in 2011 after losing his mate, 303, in 2009. Condor 375 laid an egg in the same nest cave as 303 at the RS Bar Guest Ranch. The egg (PN111) was laid on approximately February 8 and both parents exhibited an expected pattern of incubation duties. On March 6, 375 was trapped to replace two malfunctioning transmitters and we detected an elevated blood lead level. She required three weeks of treatment (first at Pinnacles, then at the LA Zoo) to bring lead levels within safe limits. During this period, her wild laid egg was swapped with an artificial egg. Condor 313 maintained his duties of sitting on the egg for the entire time 375 was undergoing treatment, a total of 19 days, from March 6 through March 24. When 375 was released on March 25, she went to her nest the same day and switched out incubating with 313. After ensuring both parents were back into a normal pattern of incubating, we placed a pipping egg (11Sixu1) into their nest in early April. The placement went smoothly and the egg hatched successfully.

Because this nest was on private property, we had very few observation days of the nest throughout the nestling season, but we were able to perform the full schedule of standard Recovery Program nest entries for health checks at 30, 60, 90 and 120-days. Overall, each entry went as planned and the blood lead levels of the nestling were never high enough to require evacuation. No trash was found in the nest during any entry. We administered West Nile Virus vaccinations during the 30, 60 and 120-day checks. We also attached a radio-transmitter during the 120-day entry. Based on our experiences at this nest, we recommend having three people present during 30, 60 and 90-day entries and four people for the 120-day entry. We also believe it is critical that a highly experienced condor handler be the first to corral a 120-day nestling, due to the exposure of the nest ledge and to ensure that the young bird stays in the nest.

In September, Condor 598 fledged from her nest. The land manager reported that she was seen at the top of her nest cliff in mid-September and we confirmed fledge on September 28 while observing the nest. Condor 598 did not take any flights during this observational period, but she was perched in a pine tree to the south of the nest. In the weeks that followed, crew members tracked her progress via radio-telemetry. In late December, a crew member tracking from Highway 25 saw 598 a few miles to the south of her nest. This nest was the only successful one in central California this year.

Mortalities

There were no mortalities of Pinnacles managed condors in 2011.

Case Studies

Condor 595

In 2011, Condor 595 was foster-reared by Condors 318 and 317 at a nest within Pinnacles. Following the USFWS endorsed protocol, this nest was entered four times during the nestling stage. Entries occurred when the nestling was 30, 60, 90, and 120-days old. Each entry went well and lead levels were never high enough to require evacuation.

The 120-day nestling check occurred on July 21 and went as planned, with no safety issues for staff or condors. A final West Nile Virus vaccination was administered, blood was drawn, and a transmitter was attached to the left wing. When 595 was placed back into her nest cave, a crew member made sure she looked normal and noted that 595 lifted both wings over her head in a defensive posture. The next day, two crew members observed 595 at her nest. She was mostly obstructed from view by one of her parents, but they interacted normally. On July 28, another observer watched this nest and noted 595 was not very active and was barely visible in the cave. On July 30, 595 was in full view and was holding her right wing slack. One week later, while observing the nest, 595 was seen running/stumbling down the rocky ramp that led from to her nest cave to another cavity below. During this movement, it was clear that her right wing was dragging on the ground and hanging at an odd angle when compared to her left wing. Biologists decided to recapture 595 and examine the wing.

A team was mobilized that included a veterinarian and on August 5 they re-entered the nest. The nest entry went smoothly and when 595 was captured and inspected, there was a severe wing injury and the humerus appeared to be broken near the shoulder joint. Condor 595 was immediately evacuated to the LA Zoo for further evaluation. The radiographs at the zoo indicated that a complete fracture of the humerus near the shoulder joint had occurred and that a large area of calcification had developed. The veterinarian estimated that the wing injury had occurred 7-10 days earlier based on the amount of calcification. It was considered too risky to perform any type of surgery, so this condor was taken into the care of the LA Zoo keepers. The keepers performed daily physical therapy with 595, so they habituated her to people to make the therapy less stressful. Inspection of the wing break suggested a traumatic fall was the most likely cause of the injury. Because of the topography of the nest site, the young condor could readily have walked back up to the nest cavity even if it had fallen from the area immediately outside the nest cavity. The attending veterinarians concurred that the injury could not have been related to the handling event during the 120-day nest entry.

This condor will never be released into the wild and, given the bird's condition, the Recovery Program should discuss whether to euthanize condors with such injuries or retain them for display or research purposes.

Condors 330 & 405

2011 was the first year we were not able to capture several birds for routine health checks. Male condors 330 and 405 had not been handled since the fall of 2010. Condor 330 was last handled

on September 29, 2010 at the captive facility in Big Sur. Condor 405 was last handled on November 22, 2010 at the Pinnacles' captive facility. Both birds were elusive and after late winter were only seen within the boundaries of Pinnacles a few times. Condor 330 was seen a total of 32 times in Pinnacles during 2011, the majority of these observations were prior to February 26, when he was last seen at the captive facility. Condor 405 had a similar history of infrequent park use. We had 26 visuals of him in Pinnacles in 2011. He was last seen at the captive facility on February 26, 2011, the same date as 330. Because both birds were using the vast landscapes and resources outside of the park, we were not able to trap or handle them for lead or health checks the entire year. With this new difficulty in trapping, one of the birds became "stealth", with no functioning radio or GPS transmitters. As a result, 330 has only been seen via observation during mobile tracking expeditions outside of Pinnacles and will continue to be difficult to trap in the future. Other condor field release sites have had similar complications with "stealth" birds and difficulty trapping due to the expanding range of some condors and their use of surrounding landscapes. This is a new challenge to the Pinnacles Recovery Program and we are trying to locate suitable places outside of the park for a mobile trapping station.

Management Results

Hazing

Pinnacles biologists hazed condors when we observed them in locations that could lead to their harm. There were nine hazing events involving Pinnacles condors in 2011. The condors were hazed for a variety of reasons, using several different methods. Condors 411 and 543 were hazed from the High Peaks Visitor Lunch Spot, due to proximity to a park trail and visitors, as was Condor 451 on a separate date. Condors 460 and 478 were hazed for landing on the North Chalone Fire Tower. Condor 318 was also hazed from the North Chalone Fire Tower after he was observed picking at the roof shingles. During a handling day at the Pinnacles Facility, Condor 460 was hazed for landing on the roof. Three Pinnacles condors were hazed by VWS staff in Big Sur. Condors 332 and 340 were hazed along Highway 1 and Condor 310 was hazed from a tree (all due to their proximity to roads). There were an additional two large hazing events involving multiple Pinnacles condors. First, a group including 313, 330, 332, 400, 401, 405, 431, 514, 525, 543, and 547, was hazed off Hwy 25 in Bitterwater after they were observed picking at a plastic bag on the side of the road; and then ten unidentified condors were hazed from Hwy 25 in Bitterwater due to their proximity to the road. Only two condors (332 and 543) were hazed more than once. The hazing methods, which varied depending on location and availability of supplies, included running and clapping, slapping wood blocks together, throwing pebbles near, but not at, a condor, and spraying with a toy water cannon.

Proffered Baiting

There are three locations where we placed proffered carcasses at Pinnacles (Facility/Flight pen, Hilltop, and Command Post). Most of the proffered carcasses were calves from organic dairies in Modesto, CA. In 2011, 103 calves, 30 pigs, one deer, one rabbit and three bags of rats were fed, Table 1. The total represents a minimum number that were placed since at times the carcass placements were not recorded in detail.

Table 1. Number, type, and placement of proffered carcasses.

Type of Carcass Placed	Captive Flight		Command	
	Pen	Hilltop	Post	Total
No. of Calves	56	40	7	103
No. of Pigs	15	13	2	30
No. of Bags* of Rats	3	0	0	3
No. of rabbits	1	0	0	1
No of Deer	0	0	1	1

*Note: there are 15-25 rats per bag

Surgeries

In 2011, two Pinnacles-released condors had surgery to repair patagial holes. Condors 310 and 478 both had patagial holes that had enlarged to the point of requiring surgical intervention to prevent transmitters from causing a tear. While some patagial pierced holes will close on their own, holes on these two birds were particularly large. In June, 310 had surgery to repair 16 mm holes in both wings and in October, 478 had a 15 mm hole on his right wing and >20 mm hole in his left wing repaired. Dr. Amy Wells at the Avian and Exotic Clinic of the Monterey Peninsula performed both surgeries. Each condor had a successful surgery and recovery.

Chelations

In 2011, seven Pinnacles condors were treated for elevated blood lead levels. One condor, 411, was treated three times during the year. All seven condors were treated at the LA Zoo, but one of 411's treatments occurred at Pinnacles. The threshold the biologists used to determine initiating chelation was a blood lead value of 35µg/dL or greater on a LeadCare Analyzer, which was an increase from previous years in which the threshold was 25µg/dL or greater. Both the LeadCare I and LeadCare II Analyzers were used depending on whether the condor was handled at the Pinnacles facility (LeadCare I) or the VWS Big Sur (LeadCare II) facility. One condor, 431, was given a single calcium EDTA injection by VWS staff and placed in the Big Sur flight pen since its field lead score fell between the old and new thresholds of 25µg/dL and 35µg/dL.

Radiographs

During the course of 2011 there were seven individual condors given radiographs after receiving an elevated blood lead level on the LeadCare field tester. Of the seven birds, Condor 411 was also radiographed a second time for a separate lead event. Condors with metal fragments in their gastrointestinal tracts were 310, 411, and 448. The condors that were clear of metal fragments were 312, 332, 401, and 514. All radiographs were in response to elevated lead levels or other health concerns.

Vaccinations

Between the spring and fall trapping seasons, the West Nile Virus (WNV) vaccination protocol changed from vaccinating condors based on titer results to annual vaccinations for all condors. Pinnacles staff followed the new disease survey protocol as closely as possible. Although not every condor was vaccinated in the fall, many were. We gave 32 WNV vaccinations to 25

Pinnacles condors in 2011. Three adult condors were given two vaccinations during the year and two nestlings were each given a series of three vaccinations in accordance with the vaccination protocol for nestlings. In the spring, 14 blood samples had been taken from 11 condors with the intent to analyze the samples later in the year for titer levels. However, with the protocol change, these samples were not analyzed.

Fire Tower Mitigation

In April 2010, multiple condors on multiple days were seen perching at an old CalFire fire lookout tower within the park at North Chalone Peak. They were seen perching on the ground, the roof, the railings, and on an old propane tank. They were also seen picking at and apparently ingesting unidentified items on the ground. The condors confirmed at the tower included 318, 340, 411, 421, 418, 438, and 448. In addition to extra visits to the site by the crew to haze condors landing at or near the tower, the program manager initiated park planning and compliance procedures to identify whether installation of bird diverters would be feasible.

Also, during the spring of 2010, condors 318 and 317 nested in the park and in May their nestling 550 was determined via blood test during the standard 30 day nest entry to have a high lead exposure. Condor 550 was removed from the wild due to the high lead exposure and evacuated to the LA Zoo (see the 2010 annual report for a more complete discussion of this case study). Later that year, when the lead isotope analysis was performed by UC Santa Cruz researchers on blood samples collected from 317, 318, and 550, the isotopes for 318 and 550 were distinct from the vast majority of condor blood samples and the signature of pre-release condors. They were also outside the typical range of lead ammunition isotope ratios identified in ongoing studies by UC Santa Cruz. After inspecting the area where condors had been observed retrieving items from the ground around the fire tower, a Pinnacles employee took samples of paint flakes collected from the North Chalone fire lookout tower and the old propane tank to have the lead levels and isotopes analyzed. Samples from the fire tower had high lead content and isotopic signatures that matched the lead isotopes in the blood of 318 and 550. The propane tank paint had low lead content and was therefore not a suspected source of the exposure.

As a result of these findings, NPS mobilized to find solutions to mitigate this threat. Condor biologists redirected survey efforts by spending multiple days each week at the tower and hazing away any condors that came near. From late November 2010 through December 2011 condors were observed a total of 118 times. These observations were of known and unknown individuals, with some more than once in the same day. Of the 118 observations, 15 were of condors perching in the area. The park launched planning, compliance, budgetary, and procurement efforts to identify and launch a mitigation strategy. Removal of the fire tower was rejected in order to allow for more time to undergo a full review of the historic fire tower and possible rehabilitation strategies. The mitigation strategy chosen was to remove the lead paint from the building, repaint, and vacuum or hand remove paint flakes from the ground around the tower. The propane tank was also removed from the site separately as it was owned by another company. Due to required training to perform lead paint removal, the site mitigation needed to be accomplished by a licensed contractor and could not be performed by Pinnacles staff.

NPS consulted with the State Historic Preservation Officer and formulized an emergency plan to mitigate the lead paint exposure. Park staff also explored multiple avenues within the NPS to

secure emergency funding to conduct the mitigation work and then create a scope of work and open a competitive bidding process to contract the work as soon as possible. Work on site was initiated in October 2011. Some wind delays extended the anticipated timeline of project completion but mild autumn weather allowed significant progress and the project was completed by the end of the year. Although the vast majority of the lead paint was removed through scraping or removal and replacement of entire boards, the initial project design to chemically remove all remaining lead paint was abandoned due to the amount of time this treatment was taking. Instead, the final portions of lead paint on some surfaces around the catwalk area and observation windows were left on the building and covered with a new paint surface. By December 2011, the lookout tower was fully repainted and the contractor had disposed of all visible paint chips on the ground surrounding the tower by either vacuuming or hand removal. Several shrubs in the immediate vicinity of the tower were removed during the work to improve surficial clean up. Condor biologists periodically hiked to the tower to radio track and, while there, removed any litter found subsequent to the mitigation project.

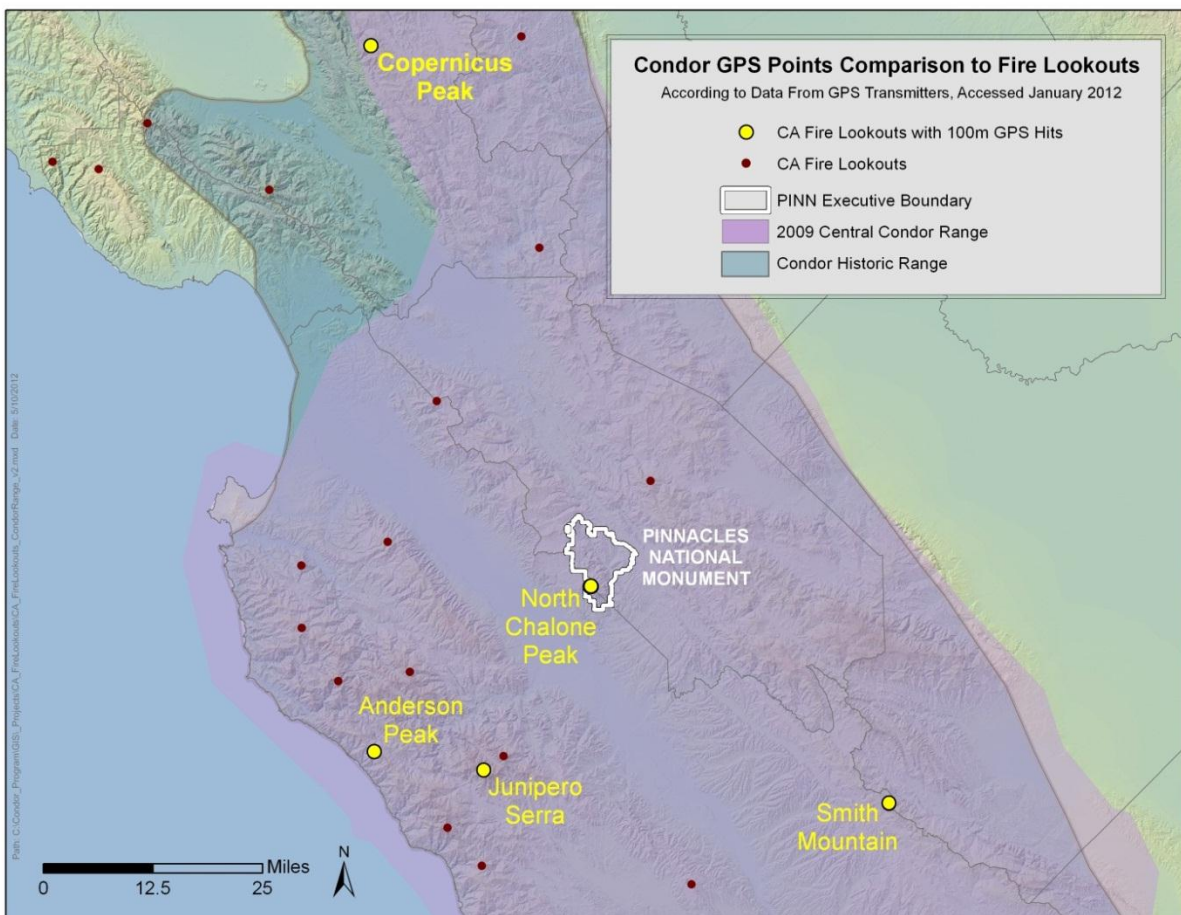


Figure 1. Fire Lookout Towers and Condor GPS locations.

Additionally, Pinnacles' staff used GIS to review the likelihood of condor interactions with other fire towers in central California. Because fire lookout towers are at high points that provide vantage points for condors, these structures present greater risk of condor-building interactions than buildings located in valleys. Therefore, fire lookouts were mapped and overlaid with all of

our condor GPS data. In the state of California, there are more than 500 fire lookouts. For this exercise, only towers that fell within the condor historic range (in Alameda, Fresno, Kern, Kings, Los Angeles, Madera, Merced, Monterey, San Benito, San Bernardino, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, Stanislaus, Tulare, and Ventura counties) were used. A 100 meter buffer was created around each fire tower. All GPS data (over 159,000 points) collected for condors wearing GPS transmitters operated by Pinnacles at the time were used in the analysis. All data points where a condor was within the 100 meter buffer of a fire lookout were highlighted, Figure 1.

The results of the GIS analysis revealed that seven condors had been near five different towers on some occasion. North Chalone Fire Tower, known through observations to have been a site of condor interaction with the structure, had GPS point data for five condors within the 100 m buffer on 48 occasions. By contrast, three other lookouts had one condor position on only one occasion. One additional fire lookout had positions of two condors occurring within the 100 m buffer on three occasions. These results suggested that the level of threat other towers pose to condors in the central California flock was not nearly as high as that posed by North Chalone. However, condor activity around the North Chalone tower seemed to increase in conjunction with PINN birds beginning to breed. We had not observed condors picking up litter around the North Chalone Fire Tower previously and it is possible that birds were picking up litter that looked like bone fragments to feed their chick. We recommend that all fire tower positions be periodically reviewed against condor GPS data to assess whether condors become attracted to another structure in the future.

Research

Feather and Blood Pb Isotopic Fingerprinting

In 2011, Pinnacles 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. We attempted to measure and mark at least one growing feather every time a free-flying condor was trapped. However, this was not possible if they did not have any growing primaries at the time handled. If a condor had molted a previously sampled feather, we tried to collect another sample.

In 2011 only high priority samples from known Pb exposure periods were collected from condors. During the year, a total of 55 feathers were notched for measurement on 25 individual condors. We also collected one feather sample from a total of 15 individuals.

In addition to feather studies, blood lead isotope ratios were being analyzed. During each initial handling of a condor, a vial of blood was collected for this study. Condor isotopic ratios can be compared to ammunition and other possible sources of lead exposure. The results of this research are pending publication.

Recovery Program Lead Sampling

Field biologists at Pinnacles continued semiannual condor blood lead level sampling during spring trapping and fall trapping. Additional blood samples were collected at other times of the

year when a condor was trapped for transmitter maintenance or other needs. Blood samples were sent for lead analyses to either the UC Davis Animal Health and Food Safety Laboratory or Louisiana State University for analysis and more precise testing than possible 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 not included here.

Trash in Condor Nests

During all condor nest entries, biologists inspected the nest surface and sift the substrate to document the presence of anthropogenic materials. Nestlings were also palpated to identify foreign material when possible. In 2011, we completed a thorough review of all trash removed from nest sites involving Pinnacles condors from 2009 to the present. Trash was documented in an Excel spreadsheet (PNM_CACONest SummaryData), stored in sealed plastic bags, and archived on site at Pinnacles. Non-nest trash (e.g. recovered from condor castings in the flight pen or at the base of roost trees) was also documented and archived. For the seven condor nest attempts from 2009 to 2011, the amount of trash found was relatively light compared to levels of trash recovered from nests managed by other release sites, which led to trash impaction in nestlings. Minimal amounts of nest trash were recovered from SB01 in 2009, TR01 in 2010, and MAT3 in 2011. Pinnacles staff will continue to remove trash from condor nests and document materials to determine quantities, types, and mass of trash collected from nest locations over time.

Feather Growth Rates

If a condor was being held for a week or longer for chelation or another management issue, or if a bird was trapped twice while a single feather was growing, biologists collected feather length measurements on multiple dates on the same primary feather. Our total sample size remains small, but we hope to develop sufficient data in time to review feather growth rates. The primary goal is to determine how consistent growth rates are over time.

Chelation Effectiveness

As of 2011, there was no study of chelation effectiveness in California condors. For a few condors treated at Pinnacles, we took blood samples after they received two and four chelation treatments and analyzed these samples for their lead values. From prior years, Pinnacles recorded dozens of samples of blood lead values post-chelation. These values should indicate how fast chelation treatment reduces the lead load in condors. Additionally, we started looking at natural lead depuration when treatment was not given. For condors that had a field lead value > 25 and <35µg/dL, we held them two weeks and sampled blood once per week. These data may help inform future research and 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 employed varied outreach funds and efforts to educate diverse public groups on the impacts of

lead on condors, other wildlife, and human safety, as well as the benefits of removing lead from the landscape.

Targeted Outreach Efforts

The National Park Service funded a biologist at Pinnacles half-time annually to focus on lead awareness outreach in collaboration with a biologist from the Institute for Wildlife Studies (IWS). Together, they worked to create, update, and distribute posters, brochures, web content, and videos. They also completed a major content expansion and redesign of a multi-partner outreach website (www.huntingwithnonlead.org) during the year. This partnership staffed booths at the International Sportsmen's Expo in both Denver and Sacramento, enabling 1,200 hunters and shooters to be directly engaged on the issue of lead impacts to scavenging wildlife. Presentations at hunter education classes, workshops, and youth hunts further expanded the audience and identified new outreach opportunities. Four non-lead shooting events were held in California and two were held in southern Utah. IWS and NPS partnered with Peregrine Fund for the southern Utah events. Additionally, outreach to other NPS park units, especially units with permitted recreational hunting, was expanded throughout the year. Pinnacles field staff regularly conducted opportunistic outreach efforts while mobile tracking. Each staff member kept a kit of brochures and a binder of key images to assist discussions with individuals that stop on the side of the highway to discuss the program.

General Community Outreach

Pinnacles staff from all divisions worked together to organize an annual condor release event, which drew a diverse group of visitors to the park. In 2011, approximately 250 members of the public watched the first wild flight of a captive-reared juvenile condor through a live video feed from the condor flight pen to large screen televisions at the park's visitor center. This event allowed the public to engage with Pinnacles staff and partner organizations and also provided a venue for in-depth discussion with the public over the course of five hours.

Interpretation and education at Pinnacles and in the local community continued to be an ongoing component of the Pinnacles condor program. Throughout the year, Pinnacles biologists and interpreters were available on the trail to provide informal, outdoor educational opportunities to park visitors. Pinnacles staff also made regular visits to classrooms in local schools to raise student awareness about condor biology and management issues. In 2011, Pinnacles staff spoke with over 1,200 visitors on trail and approximately 250 students in classrooms or during school field trips about condor recovery, nesting at Pinnacles, and lead awareness.

Safety

During 2011 staff employed safe work practices, including use of PPE, skills training, safety meetings, and awareness. As a result, there were no injuries or incidents reported during the year. We will continue to emphasize the importance of safe work practices and prioritize safety over all other program considerations.

Recommendations

- Due to the extensive time and expense of chelation treatments, as well as increased stress and possible side effects to condors, a study addressing the effectiveness of chelation should be implemented. This type of study would help weigh the costs against the benefits of chelation treatments and may lead to revising chelation protocols. We have been seeking funding from NPS to partner with UCSC on a comparison of feathers that grew during lead exposure while free-flying in the wild without treatment to feathers that grew during chelations treatments. Continuation and expansion of the multi-partner lead awareness campaign will be essential to increasing knowledge and understanding of this fundamental issue to both key constituencies and the general public.
- Although lead has been proven as the main limiting factor in California condor recovery, other environmental contaminants should be studied to determine the extent of their impact on the condor population.
- Continued collaboration between field sites and zoos to train handlers and nest entry personnel will ensure safe and effective research and recovery programs.
- Further community outreach efforts focused on fostering stronger relationships with local landowners may open communication lines and opportunities for condor sightings outside the park boundaries.