

A Synopsis of Bill Heinrich's Power Point Presentation:

An Overview of The Peregrine Fund's Projects

(Presented to Volunteers Nov. 4, 2006)

*Note to readers: The numbers and descriptions below refer to the slides presented in the presentation and are not available in this document.

1. Introduction Slide:

2. The Peregrine Fund: Our organization was founded by Dr. Tom Cade, then the professor of ornithology at Cornell University. We have a staff of over 100 employees, a board of directors made up of a multi national group of both scientists and businessmen. We are headquartered at The World Center for Birds of Prey in Boise, Idaho. We also have a number of field offices both in the U.S. and abroad.

3. World Center for Birds of Prey: Construction of our facility began in 1984 and we are located on 580 acres. We currently house over 200 birds of prey. Our complex of buildings is made up of the Archives of Falconry, a research library and the specimen collection, raptor propagation facilities, administrative offices, and a raptor food production facility.

4. Results: With our captive propagation work we have hatched and raised over 5,000 individuals from 10 species. Our restoration work includes restoring populations of Peregrine Falcons, Mauritius Kestrels, Aplomado Falcons, California Condors, Harpy Eagles, and the Bald Eagle. We have provided hands-on training for over 2,000 people and have assisted numerous students obtain advanced degrees, and have helped with numerous habitat conservation projects. We have provided formal information in the form of producing more than 1,000 books, articles, and reports.

5. Experience: Our experience includes working with 87 species in 55 countries, which includes 31 states.

6. Peregrine Falcon Restoration: We are perhaps most noted for our work with the Peregrine Falcon restoration. The Peregrine recovery program was the largest and most successful program ever to restore an endangered species. With just over 30 pairs remaining in the western states in the early 1970s, we produced and released 3,318 peregrines. An additional 3,653 Peregrines were released by Raptor breeders and conservation programs in the Mid-West, west coast and Canada. In 2003 we published a book that included stories from nearly everyone involved with Peregrine Falcon Restoration in North America.

7. Peregrine Propagation: These same techniques are almost the exact ones we use for Aplomado Falcons. Throughout the Peregrine years we maintained a captive population

of between 40-50 pairs of falcons. When the breeding season begins, one egg is laid approximately every day until the clutch of three or four eggs is completed.

8. Incubating: After the clutch is complete we allow the adults to incubate the eggs for approximately 10 days. This increases the hatching success dramatically.

9. Incubator: The eggs are then pulled from the adults, brought into the lab, and placed in an incubator where they will remain just prior to hatching.

10. Incubators: Numerous incubators are required to handle the volume of eggs produced. Additionally, many of the eggs have different humidity requirements in order for them to lose the proper amount of weight before hatching.

11. Piped Egg: The eggs are measured and weighed approximately every five days to insure that the weight loss is consistent with what it should be. When the egg pips it is placed in a hatcher.

12. Hatched Aplomado: For decades we have been raising over 100 falcons per year. This year (2006) alone we produced 132 young Aplomado Falcons.

13. Cal Feeding: Once the young hatch then fed by hand every few hours for approximately a week.

14. K-Pad: The young are kept next to a K-Pad (heating pad) which has warm water circulating through it. These are the same heating pads used in many hospitals.

15. Young: The young are kept next to the K-Pad and covered with a towel to maintain the proper temperature. If they get too warm they simply move away from the pad.

16. Adult Feeding: After the young are one week old they were placed under a pair of adults who raised them until they were transported to the release site at approximately 35 days of age.

17. Peregrine Flight: After the release of just 7,000 Peregrines and the establishment of over 1,660 pairs through out North America, the Peregrine was removed from the Endangered Species List in 1999. In 1997, The Peregrine Fund terminated our peregrine work and began to concentrate on our Aplomado Falcon and California Condor programs.

18. Aplomado Restoration: The last known breeding pair of Aplomado Falcons found in the US, nested near Deming, New Mexico in 1952. In 1984, the Peregrine Fund began a pilot program which established our breeding pairs, while we began experimental releases. With our Peregrine Falcon restoration near completion, we began raising Aplomado Falcons in earnest beginning in 1993.

19. Aplomado Falcon: The Northern Aplomado Falcon, *Falco femoralis septentrionalis*, is the only falcon in North America that remains on the Endangered Species List. It is smaller than a peregrine, with females weighing about 400 grams and males one third smaller. The Aplomado Falcon is quite beautiful and sought after by bird watchers around the world.

20. Captive Population: From 25 nestlings taken from the wild in southern Mexico we developed our captive population, and we have 48 individual pairs in our breeding chambers. Since 1993, we have released 1,268 Aplomado Falcons in south and west Texas.

21. Aplomado Nesting/Young: We have established over 50 pairs which have now fledged over 239 young on their own. Unlike Peregrines which nest on cliffs, Aplomado Falcons take over the nests of other species including the nests of ravens and other raptor species. Their diet consists almost entirely of small birds.

22. Map: The crosshatching represents the historical range of the Aplomado in the southern US and Mexico. At this time a stable wild population has been established in South Texas. We are now only conducting releases in West Texas, and Just last year began releases in New Mexico.

23. South Texas Gulf Coast: The habitat in South Texas appears to be ideal to maintain the newly established population. This humid area occurring along the gulf coast maintains an abundance of nesting opportunities and a substantial prey base.

24. West Texas: The Marfa grasslands, where our releases are occurring in West Texas, is much dryer and more susceptible to periods of drought.

25. Aplomado Young: Unlike the captive peregrine young who were raised by adults before going to the release sites, the Aplomado young are raised entirely in the lab in sibling groups to prevent imprinting.

26. Release Tower / Hack Box: The young are transported from our breeding facility to the release sites in cardboard boxes, by chartered planes or by vehicle. They are placed in a hack box in a tower above the ground at about 35 days of age.

27. Hack site attendants: Two attendants care for the falcons for seven to ten weeks until they become independent and begin dispersing from the release site.

28. Brooders: The falcons are fed Coturnix Quail that have been produced at our facility in Boise. Last year alone we raised over 60,000 quail to feed the falcons at release sites and our breeding facility.

29. Chickens: All of the food for or falcons, and the majority of the food that we feed the condors are raised at the WCBP.

30. Release: After about one week in the box, the falcons are released at between 39 and 41 days of age. This is the same age when they would fledge naturally in the wild.

31. Flying Pair Aplomados: After release, the young begin making their first flight and become used to the surrounding area from outside the box. This is a critical period as they are the most vulnerable to predation and becoming lost during the first few days after release. Unlike peregrines, Aplomado Falcons are quite gregarious, often flying and hunting together. Aplomado Falcons begin breeding between two and three years of age.

32. Observations: Of the 50 pairs monitored in south Texas last year, 33 pairs were successful in fledging 56 young.

33. Nesting and eggs: In some instances where falcons chose to nest in low brush or even on the ground, we have had successful nest failures due to both mammalian and avian predation. Coyote's, raccoons, and Great Horned Owls are the most threatening.

34. Nesting Platforms: In order to counter act the predation problems near nests that failed we constructed predator proof nesting platforms which contained an artificial nest. The falcons soon began utilizing many platforms which contained an artificial nest. The falcons soon began utilizing many of the platforms. We placed a total of 25 structures out in south Texas over the past few years.

35. Nesting in Platform: During the past breeding season, 18 of the platforms were occupied and nest failures dropped dramatically.

36. Adults and Young in wild: As previously mentioned, this season a total of 56 wild young fledged from both natural and artificial nest sites in south Texas. The goal is to continue with releases in West Texas and New Mexico until a viable population is established and the Aplomado Falcon is removed from the Endangered Species List. Hopefully this will occur within the next decade.

37. Peregrine Fund Condor Program: The first breeding facilities were established in California at the San Diego Wild Animal Park and the Los Angeles Zoo. In 1992 The Peregrine Fund was requested by the USFWS to become the third breeding facility for California Condors. We agreed as long as we could manage the release program in Arizona near the Grand Canyon.

38. Numbers of Condors: At this point there are a total of 289 California Condors in existence. The wild population in Arizona is now 63; we maintain 37 adults and 16 juvenile condors at the WCBP.

39. California Condor: The California Condor is in the New World Vulture family- Cathartidae. It is one of the only two condor species in the world. The other is the Andean Condor native to South America. It is the largest flying bird in North America and has a wingspan of just under 10 feet, and weighs between 16 and 26 pounds.

40. Prehistoric Range: 10,000 years ago the California Condor ranged from New York State to the east and southward from Florida extending to northern Mexico and north to South British Columbia. Their range contracted dramatically with the extinction of most large megafauna at the end of the Pleistocene era 10,000 years ago.

41. Between the 1920s through the 1980s their range was restricted to a small area in southern California.

42. Condor Standing: By 1982 only 22 individual condors could be accounted for both in the wild and captivity.

43. Flying Condor: In 1987 the USFWS made the decision to bring the last remaining wild condors and place them in breeding programs.

44. Breeding Facility: In 1993 The Peregrine Fund constructed a 17,000 square foot breeding facility at the WCBP which would house 10 pairs of condors. A second facility which would hold an additional 10 pairs was constructed a year later. All of our breeding condors came from San Diego Wild Animal Park and the Los Angeles Zoo.

45. Chambers: Each of the two condor facilities have 10, 20x40 foot breeding chambers which will accommodate 20 breeding pairs.

46. Breeding Facility: each building has an upstairs and down stairs center hallway where the condors can be observed through one way glass window. In addition each chamber is equipped with two video cameras, where adults can be observed in their nesting areas, as well as outside.

47. Monitoring: Every breeding chamber at the WCBP is equipped with video cameras that can be observed at a central station in the lab.

48. Coaxial Cable: We have over 20 miles of coaxial cable running underground from all of the breeding facilities to the lab.

49. Inducing Condors: In the wild condors generally lay one egg every other year. In captivity they can be induced to lay up to three eggs in one season. After a captive pair lays an egg, we allow them to incubate the egg themselves for approximately 10 days. We then pull the egg and they usually will recycle and lay a second egg one month later. In instances where we want the adults to raise their own young, we pull the egg and give the adults a dummy egg which they incubate until we have a piped egg to place under them.

50. Captive Breeding: Currently we are placing a piped egg under a pair of adults and letting them hatch and rear the young until they fledge in the breeding chamber. In the past years we have raised young with a puppet resembling an adult condor head. This year all 12 of the young we produced were reared under adults.

51. Incubators: Just as with the falcon eggs, the condor eggs are incubated in incubators with different humidity requirements so that the eggs will lose the proper amount of weight before hatching.

52. Brooders: After the chick hatches it is placed in a human infant isolate.

53. Lab: The chicks are kept behind the curtain and will only see the puppet during feeding. All visual contact with humans is minimized.

54. Rearing rooms: At 20 days of age the young are moved to a small 4x4 ft. rearing room where they can view adult condors from a distance. These adults act as mentor birds.

55. Cameras: Video cameras are installed above each room. At fledging age the young are moved to the third facility which has two 50x80 foot fly pens. They are held in these large flights for up to a year before being transported to the release site. During this time they learn to socialize with other condors and begin developing their flight skills.

56. Vermilion Cliffs: Our first release site was established at the Vermilion Cliffs in northern Arizona in 1996. The cliffs are located approximately 50 miles north of the Grand Canyon. We selected this site because we had four wheel drive vehicle access to the top of the cliffs where we built our facilities. We also had good access along the bottom of the cliffs for monitoring the birds movements.

57. Reintroduction Area: The release site itself is located on the west side of a large plateau in north central Arizona. We believe that this is the best available habitat in the United States, surrounded by thousands of acres of public land with what appears to have an almost unlimited carrying capacity for future generations of nesting condors.

58. Kennels: The condors are transported from the breeding facility to the release site in large dog kennels.

59. Carrying kennels: They are driven to the top of the cliffs and carried for half a mile to our release and holding facilities. We have a staff of eleven full time biologists working on this site.

60. Flight Pen: The young are held in a large 40x60x14 foot flight pen for many months before being moved to the release pen. We also hold additional condors in the flight pen when they are temporarily brought in from the wild for medical treatment or behavioral problems.

61. Release Pen: Young are moved to the release pen and held for about a week before being released.

62. Release: We have learned through the years that it is best to release condors in small groups of between one to five birds during winter months.

63. Roosting Safely: Immediately after release the young condors need to learn how to interact with the free flying condors, and compete with them for food. They also need to learn how to roost in safe areas in order to avoid predators such as coyotes and golden eagles.

64. Monitoring: We monitor all of the birds visually by using numbered patagial wing tags, which identify each condor.

65. Transmitters: Each condor also has one to two conventional radio transmitters attached to the patagium as well. For the past three years we have been using satellite transmitters with GPS capability.

66. GPS transmitters: The GPS transmitters are solar powered and do everything that a hand held GPS unit can do, including giving the exact location of the condors throughout the day.

67. Flying Condor: We currently have GPS transmitters on 12 condors and by the end of the year we should have them on 21 individuals.

68. Map: This map shows 8 days of movement. We are now able to plot the movements of the birds on a daily basis. Last March we tracked a bird for eight days. It traveled 468 miles and visited three states.

69. Map: We are also able to determine movement patterns of the condors during different times of the year.

70. Feeding: We can also determine where condors have been feeding. During the hunting season we often find condors feeding on deer carcasses that have been shot and accidentally lost.

71. Dead Condor: Radio tracking also allows us to locate dead condors. Each transmitter is equipped with a mortality mode which is activated when a bird does not move for 24 hours. To date we have discovered that the leading cause of mortality is lead poisoning.

72. Lead Pellets: In 2000, we had our first mortalities from lead poisoning, four years after our first release. You can actually view the lead pellets in this radiograph of one of the first birds that we have lost. Since that time we have now had lead pellets or fragments show up in 14 radiographs. Nine of the birds lived after going through chelation treatments, and five have died.

73. Condor in Flight: Condor survival depends on close hands-on management. We now trap all of the birds in the population at least twice a year and check their blood for elevated lead levels. Last year we ended up chelating 15 individual condors which may have otherwise died. The treatments consist of giving the birds injections of Calcium

EDTA twice a day for five to ten days. The chemical removes the lead from the condor's system.

74. Radiograph: One of our biggest challenges was to discover just how the condors were ingesting lead. Our first controlled experiment was to take radiographs of deer shot with conventional lead ammunition. We knew that retrieved weight of retrieved bullets from animals shot with lead ammunition often weighed up to 40% less than the original weight of the bullet. As hunters ourselves, we were shocked to find literally hundreds of lead fragments along the bullet pathway through the animal. Now we knew how the condors were being exposed to lead, but this research also has implications for other animals as well as humans.

75. Research: We currently have three scientific papers in publication. The first, "Bullet fragments in deer remains: implications for lead exposure in condors," has been published. The second two, "Survival and reproduction of California Condors in Arizona" and "Five years of lead exposure among California Condors released in Arizona" will soon be published.

76. Fragment Study: In our first study of Rifle Bullet Fragments, 14 carcasses were radiographed and each had an average of 138 visible fragments per animal. This told us all we needed to know. As shocking as it was for us, it was just as shocking when we presented the results to the Arizona Game and Fish Department.

77. Copper Bullet: There is a solution. For a number of years solid copper bullets have been being manufactured by some companies. Although more expensive than some lead ammunition, the bullets perform as well or better than their lead counterparts. The main advantage is that they do not fragment when they pass through an animal, and almost always retain 100% of their original weight. Last year the Arizona Game and Fish Department made free copper ammunition available to 2,393 hunters who drew hunting permits near where the condors were foraging. Out of a total of 1,551 hunters, 65% took advantage of the program and the condors had 40% drop in toxic lead levels over the previous years. The Department is providing hunters with the opportunity again this year. If this voluntary cooperation from hunters continues, the future of establishing a viable condor population will become a reality.

78. Breeding in the wild: Our first breeding success occurred in 2003, when the first young condor fledged from a nest in the Grand Canyon. This was the first young Condor to fledge in the wild in over two decades. To date five wild young have fledged and four still survive.

79. Condor Pair: It takes a condor from five to eight years to reach sexual maturity. This pair produced their first young in Grand Canyon National Park in 2004.

80. Battleship: The battle ship formation is typical of the sites where the condors have been nesting. The nests have been located in large caves on cliffs that are over 1,000 feet or more in height.

81. Arizona Review: To date over 93 condors have been released in northern Arizona and there have been 32 mortalities, five returned to captivity, and five young hatched in the wild. We now have a total of 61 free flying condors and we hope to release 11 additional birds by the end of the season.

82. Program Highlights: The total number of condors in existence is 289. In captivity there are 152, in the wild there is 137 with 63 in California, 61 in Arizona, and 13 in Baja Mexico.

83. Moon/Condors: We feel that the condors can and will successfully survive in the wild. In order to continually minimize the mortality rates, a tremendous amount of hands-on management has taken place. If we can overcome the lead problem, the condors should be able to recover and maintain a self-sustaining population.