

Recovery Outline
for the
Columbia Basin
Distinct Population
Segment
of the
Pygmy Rabbit
(*Brachylagus
idahoensis*)



Photograph courtesy of the Washington Department of Fish and Wildlife.

November 2004

Common Name	Columbia Basin Pygmy Rabbit
Scientific Name	<i>Brachylagus idahoensis</i>
Listing Status	Endangered
Emergency Listing Date	November 30, 2001 (USFWS 2001)
Final Listing Date	March 5, 2003 (USFWS 2003a)
Lead Agency/Region	U.S. Fish and Wildlife Service, Region 1
Lead Field Office	Upper Columbia Fish and Wildlife Office 11103 East Montgomery Drive, Spokane, Washington 99206 Telephone 509-891-6839
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Purpose of the Recovery Outline: This outline is meant to serve as interim guidance to direct recovery efforts for the Columbia Basin pygmy rabbit until a draft Federal recovery plan is completed. A preliminary strategy for the recovery of this distinct population segment is presented, and high priority actions to help stabilize and conserve the population are identified. This recovery outline is intended primarily for internal use by the U.S. Fish and Wildlife Service

as a pre-planning document. A multi-party recovery team has been assembled to assist with development of the draft Federal recovery plan for the Columbia Basin pygmy rabbit. Formal public participation will be invited upon completion of the draft plan, which we expect to release for public review and comment during the spring of 2005. However, we will consider any new information or comments that members of the public may wish to offer in response to this outline during the recovery planning process. For more information on Federal recovery efforts for the Columbia Basin pygmy rabbit, or to provide additional comments, interested parties may contact the lead biologist, Chris Warren, at the above address, telephone number, or e-mail.

Scope of Recovery and Available Information: The recovery effort addressed by this outline applies only to the Columbia Basin pygmy rabbit. This recovery outline provides a general overview of the available information concerning the Columbia Basin pygmy rabbit, presents a recovery goal and recovery objectives, and identifies immediate and longer-term actions, along with a tentative time line for the actions, to achieve expeditious recovery of the Columbia Basin pygmy rabbit in the wild. Some of the available information addressing certain issues, such as the effects of livestock grazing, interpretation of genetic data, intercross breeding plans, and reintroduction measures, is currently preliminary or incomplete. An aim of the Columbia Basin pygmy rabbit recovery effort is to gather or generate new information to help clarify these issues, as feasible, and to incorporate any new information into recovery strategies as it becomes available. References and background information additional to that presented in this outline may be found in previous Federal (USFWS 2001, 2003a, 2003b) and State (WDFW 1995, 2001, 2003, 2004) documents.

OVERVIEW

Species Description and Life History

Pygmy rabbits are the smallest rabbits in North America, with adults weighing approximately 454 grams (1 pound) and measuring less than 30 centimeters (1 foot) in length. They are similar in appearance to cottontail rabbits (*Sylvilagus* spp.), however, they are distinguishable primarily by their very small tails, which lack any white and are nearly unnoticeable in the wild. Pygmy rabbits are found in shrub steppe habitats of eight western states (Figure 1), and are highly dependent on sagebrush (*Artemisia* spp.) to provide both food and shelter throughout the year. The pygmy rabbit is one of only two rabbit species in North America that digs its own burrows and, as such, the species is typically associated with relatively deep, loose soils. Pygmy rabbits begin breeding the year following their birth and breeding may occur from February through July. In portions of their range, females may have up to three litters per year and average six

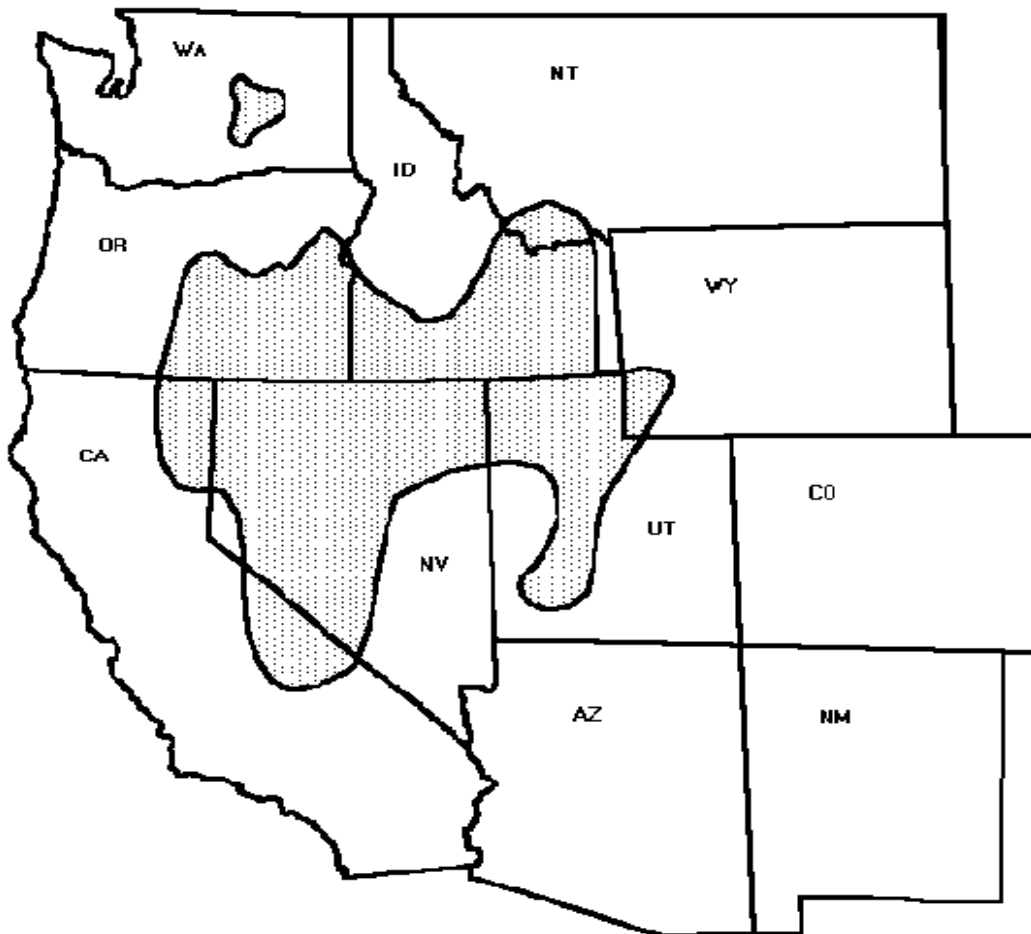


Figure 1. Historical rangewide distribution of the pygmy rabbit.

young per litter. Pygmy rabbits tend to have relatively small home ranges during winter, remaining within roughly 30 meters (100 feet) of their burrows. During spring and summer, their home ranges may average as large as 3 hectares (7 acres) for females and 20 hectares (50 acres) for males. There is little information available addressing the dispersal behavior of pygmy rabbits, although there are a few records of animals moving over 3.2 kilometers (2 miles). The mortality rates of adult and juvenile pygmy rabbits can vary considerably between years, and even between juvenile cohorts within years. However, similar to other leporid (rabbit and hare) species, the average annual mortality rate for pygmy rabbits may be 50 percent or greater.

The Columbia Basin pygmy rabbit has been isolated from other pygmy rabbit populations for thousands of years. This distinct population segment is markedly different genetically and occupies a unique ecological setting compared to the remainder of the taxon (USFWS 1996, 2003a).

Historical Distribution

Douglas, Grant, Lincoln, Adams, and Benton Counties, Washington.

Current Distribution

Possibly extirpated in the wild.

Status Summary

Historically, the Columbia Basin pygmy rabbit occurred in at least five counties in central Washington. This range has declined dramatically over the past century and, during the 1990's, only six small subpopulations were known from two counties, Douglas and Grant (Figure 2). Surveys of the last known subpopulation in Douglas County during early 2004 did not detect any animals, indicating that the population may now be extirpated from the wild.

To try and prevent the extinction of the Columbia Basin pygmy rabbit, the Washington Department of Fish and Wildlife began a captive breeding program in 2001. As of March of

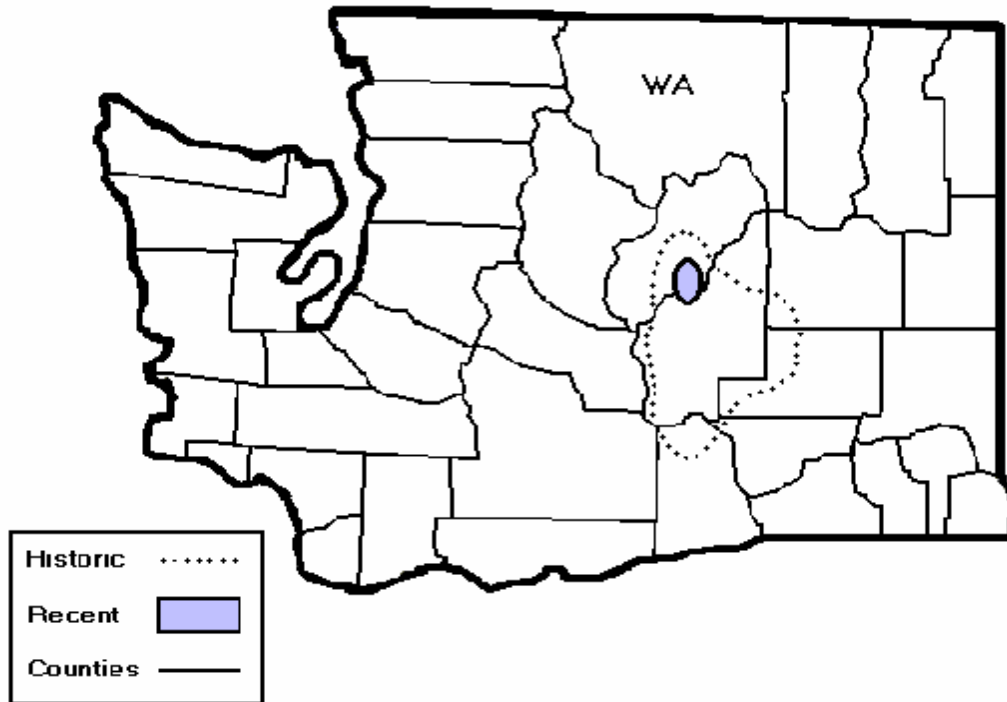


Figure 2. Historical and recent distribution of the Columbia Basin pygmy rabbit in the State of Washington.

2004 (prior to the last breeding season), 31 individuals survived in captivity, including 22 purebred Columbia Basin pygmy rabbits and 9 experimental intercross progeny (offspring produced by matings between Columbia Basin pygmy rabbits and pygmy rabbits captured in southeastern Idaho). The Columbia Basin pygmy rabbit is imminently threatened by its small population size and loss of genetic diversity, coupled with a lack of suitable, protected habitats in the wild.

Land Ownership and Management

Federal - Major Federal lands within the historical distribution of the Columbia Basin pygmy rabbit include the Hanford Reach National Monument and the Saddle Mountain and Columbia National Wildlife Refuges managed by the U.S. Fish and Wildlife Service; scattered ownership within the Jameson Lake, Douglas Creek, and Saddle Mountains Management Areas managed by the U.S. Bureau of Land Management; scattered ownership associated with the Columbia Basin Project managed by the U.S. Bureau of Reclamation; and the Hanford Site managed by the U.S. Department of Energy.

State - Major State lands within the historical distribution of the Columbia Basin pygmy rabbit include the Sagebrush Flat, Gloyd Seeps, Potholes, and Crab Creek Wildlife Areas managed by the Washington Department of Fish and Wildlife; and scattered ownership managed by the Washington Department of Natural Resources. The Sagebrush Flat Wildlife Area in southern Douglas County was the last site known to support the Columbia Basin pygmy rabbit in the wild.

Other - Non-governmental organizations and private landowners currently contributing to Columbia Basin pygmy rabbit conservation efforts include The Nature Conservancy in Douglas and Grant Counties and the Lancaster Family in northern Grant County. The Foster Creek Conservation District is in the process of developing a habitat conservation plan for private agricultural interests (*i.e.*, irrigated and dryland crops, fruit orchards, vineyards, and livestock ranching) throughout Douglas County. Most of the remaining area within the historical distribution of the Columbia Basin pygmy rabbit is in private ownership and managed primarily for irrigated and dryland crop production, livestock operations, and urban and rural developments (*e.g.*, housing, commercial/industrial facilities, transportation corridors).

Key Threats

A) Present or threatened destruction, modification, or curtailment of habitat or range:

Columbia Basin pygmy rabbits rely on deep-soil shrub steppe habitats with tall, dense stands of sagebrush and a lush understory of grasses and forbs. Dryland and irrigated crop production has converted and fragmented large portions of the native shrub steppe habitats originally present within the Columbia Basin. In addition, urban and rural developments permanently remove native shrub steppe habitats. Pygmy rabbits cannot occupy converted sites and, due to their relatively restricted movements, fragmentation of shrub steppe habitats in the Columbia Basin has severely limited their ability to disperse. The potential for enhancement, restoration, and connectivity of shrub steppe habitats are important considerations for developing appropriate recovery measures for the Columbia Basin pygmy rabbit.

Sagebrush is easily killed by fire and, when it occurs at increased frequency, fire can remove sagebrush from the vegetation community. Fire can also facilitate the establishment of invasive weed species, such as cheatgrass (*Bromus tectorum*) and knapweed (*Centaurea* spp.). Fire frequency has increased over portions of the remaining shrub steppe habitats within the Columbia Basin as a result of various influences, including informal road access and recreational activities. Due to their reliance on tall, dense stands of sagebrush and other associated shrub steppe vegetation, Columbia Basin pygmy rabbits are precluded from occupying frequently burned sites. Controlling fire in areas currently or potentially occupied by the Columbia Basin pygmy rabbit represents a significant management concern for recovery efforts.

Under certain circumstances, livestock grazing can negatively impact the Columbia Basin pygmy rabbit. Impacts may include damage to Columbia Basin pygmy rabbit burrow systems, the possibility of direct mortality due to trampling, altering rabbit movement and behavioral patterns, and decreasing the nutritional value of forage species. Developing appropriate guidelines to manage livestock grazing so as to avoid or minimize these potential impacts will be important for recovery efforts.

B) Overutilization for commercial, recreational, scientific, or educational purposes:

Accidental shooting of Columbia Basin pygmy rabbits may occur in areas open to hunting of other small game species in Washington, which could hinder recovery efforts in these areas. Measures to protect Columbia Basin pygmy rabbits from incidental or intentional harvest should be considered during recovery planning.

C) Disease and Predation: Some of the parasites of pygmy rabbits can be vectors of disease, such as plague and tularemia. Severe disease epidemics have not been reported in pygmy rabbits in the wild, and parasites have not been viewed as a significant threat to the species. However, epizootics in wild animals are often very difficult to detect and disease can not be ruled out as a risk factor. In addition, a number of captive Columbia Basin pygmy rabbits have succumbed to disease, especially coccidiosis and mycobacteriosis. Appropriate measures to monitor and manage disease in wild and captive Columbia Basin pygmy rabbits are important considerations for recovery efforts.

Predation is a major cause of mortality among wild pygmy rabbits and, due to the extremely small size of the Columbia Basin pygmy rabbit population, even low levels of predation may represent a significant risk to their establishment and long-term stability in certain areas. Potential predators include badgers (*Taxidea taxus*), long-tailed weasels (*Mustela frenata*), coyotes (*Canis latrans*), bobcats (*Felis rufus*), great horned owls (*Bubo virginianus*), long-eared owls (*Asio otus*), ferruginous hawks (*Buteo regalis*), northern harriers (*Circus cyaneus*), and common ravens (*Corvus corax*). Habitat enhancement measures to provide appropriate cover, provision of artificial structures, and/or temporary predator control are important considerations for recovery efforts.

D) Inadequacy of existing regulatory mechanisms: Classification of the Columbia Basin pygmy rabbit as a State endangered species in Washington does not provide regulatory protection of the habitats considered essential to its long-term security. State legislation does prescribe ecosystem standards for State-owned agricultural and grazing lands to maintain and restore fish and wildlife habitat by improving overall ecosystem health. However, these standards do not specifically address protection and conservation of the Columbia Basin pygmy rabbit, and are only mandated for lands under the jurisdiction of the Washington Department of Fish and Wildlife and Washington Department of Natural Resources. In addition, application of the standards on lands managed by the Department of Natural Resources must be consistent with the agency's fiduciary obligations.

Currently, large areas of privately owned land within the historical range of the Columbia Basin pygmy rabbit are withdrawn from crop production and planted to native and nonnative cover under the Federal Conservation Reserve Program, administered by the U.S. Department of Agriculture. Program contracts are limited to 10 years and the program does not include specific conservation measures for the Columbia Basin pygmy rabbit. There are few other Federal programs that regulate the conversion of native habitats or other land use practices that may be harmful to the species on non-Federal properties.

E) Other natural or human-caused factors affecting the species' continued existence:

Immediate concerns for the Columbia Basin pygmy rabbit are associated with the population's extremely small size and possible extirpation from the wild. Currently, the Columbia Basin pygmy rabbit population appears to be experiencing an unacceptable loss of genetic diversity as a result of inbreeding (*i.e.*, loss of genetic heterozygosity) and genetic drift (*i.e.*, loss of alleles). In addition, random environmental events, such as severe storms, prolonged drought, and extreme cold spells, represent a significant risk to the population's long-term security in the wild. Successful implementation of a captive breeding program, that includes appropriate genetic management planning, and a comprehensive reintroduction program, will be central to achieving recovery of the Columbia Basin pygmy rabbit.

Threats Summary: Although habitat loss and fragmentation have likely played a primary role in the long-term decline of the Columbia Basin pygmy rabbit, it is unlikely that these factors directly influenced the post-1995 declines at the Sagebrush Flat Wildlife Area and the eventual extirpation of all known subpopulations in the wild. Once a population declines below a certain threshold, it is at risk of extirpation from a number of influences including chance environmental events (*e.g.*, extreme weather), catastrophic habitat or resource failure (*e.g.*, due to fire or insect infestations), predation, disease, demographic limitations, and loss of genetic diversity. At one time or another, all of these influences have likely impacted the Columbia Basin pygmy rabbit to varying degrees and, in combination, have led to the current endangered status of the population.

Conservation Actions

Past State Efforts - The Washington Department of Fish and Wildlife has undertaken a variety of conservation actions for the Columbia Basin pygmy rabbit since 1979. These efforts have included population surveys, habitat inventory, land acquisition, habitat restoration, land management agreements, studies on the effects of livestock grazing, and predator control. Despite these efforts, in 2001 the Washington Department of Fish and Wildlife concluded that attempting to manage the remaining Columbia Basin pygmy rabbits in the wild would encumber the population with extreme risk due to the array of threats it faced. To address this risk, the Washington Department of Fish and Wildlife determined that intervention, by way of a captive breeding program, was necessary to prevent the extinction of the Columbia Basin pygmy rabbit.

Captive Breeding and Reintroduction - During the fall of 2000, the Washington Department of Fish and Wildlife, in cooperation with the Oregon Zoo, initiated studies of husbandry and captive breeding techniques using seven wild-caught pygmy rabbits from

southeastern Idaho (three female, four male) as surrogates. These studies were undertaken to improve the information base for proposed captive breeding and reintroduction efforts for the Columbia Basin pygmy rabbit. Due to concerns over limited housing capacity for all the offspring at the Oregon Zoo, and to further develop pygmy rabbit husbandry expertise, a number of captive Idaho pygmy rabbits were moved to facilities at Washington State University and Northwest Trek Wildlife Park. In 2002, Washington State University also initiated studies to investigate reintroduction techniques using the Idaho pygmy rabbits. Prior to 2004, roughly 30 litters, totaling approximately 90 offspring, have been produced from the 7 founding Idaho pygmy rabbits and their captive-bred progeny.

A total of 42 captive-bred Idaho pygmy rabbits have been experimentally released into suitable habitats in southeastern Idaho during 4 separate release efforts that were conducted in August and September, 2002, July 2003, and February 2004. The Idaho pygmy rabbits have been closely monitored since the initial release, and valuable information continues to be gathered. Various techniques are being investigated during this work, including the use of large pre-release pens to acclimate the release groups, and temporary containment fencing, supplemental feeding, and provision of artificial burrows at the release sites. Results of the studies to date include indications of the movement patterns, vulnerability to predation, habitat use, and overwinter survival of captive-bred pygmy rabbits following their release. Successful reproduction in the wild by the captive-bred Idaho pygmy rabbits was confirmed during the 2003 breeding season.

Prior to March of 2004 (*i.e.*, onset of the breeding season), 15 Idaho pygmy rabbits were still being held in captivity. As information needs remain, and funding and housing capacities allow, the husbandry, captive breeding, and reintroduction investigations using Idaho pygmy rabbits will continue.

The Washington Department of Fish and Wildlife, in cooperation with Washington State University, expedited their captive breeding program for the Columbia Basin pygmy rabbit in spring 2001. This was due to the sudden extirpation of five of the last six known subpopulations and the dramatic decline in the last remaining subpopulation of Columbia Basin pygmy rabbits during the late 1990's. The immediate goal of the program was to capture up to 20 Columbia Basin pygmy rabbits to establish a captive breeding stock. Ultimately, the goal of the captive breeding program for the Columbia Basin pygmy rabbit is to release captive-bred animals back into suitable habitats within the population's historical range where viable subpopulations can be reestablished.

Between May 7, 2001, and January 15, 2002, 16 Columbia Basin pygmy rabbits (9 female, 7 male) were captured and removed from the Sagebrush Flat Wildlife Area as an initial source for captive breeding efforts. In addition, shortly after capture one female gave birth to a litter of five offspring (two female, three male) that were conceived in the wild. In order to reduce the risk of catastrophic loss of a single captive population at Washington State University (*e.g.*, from disease epidemic, predator access, vandalism) and to improve the efficiency of captive rearing efforts, seven of the wild-caught Columbia Basin pygmy rabbits (four female, three male) were placed at the Oregon Zoo facility prior to the 2002 breeding season. Current plans call for the addition of Northwest Trek Wildlife Park as a third captive breeding facility. A third facility will add needed capacity to house a sufficient number of animals for the captive breeding program, improve the efficiency of captive rearing efforts, and further reduce the risk of losing a large proportion of the captive population at any one facility.

Prior to 2004, the 21 founding Columbia Basin pygmy rabbits and their captive-bred progeny produced 9 purebred litters, totaling at least 34 offspring. During the same period, 31 purebred Columbia Basin pygmy rabbits died from a number of causes (Table 1). Various procedures have been implemented or are currently being tested at the captive breeding facilities to reduce the risk of capture-related mortality of pygmy rabbits, including updated protocols to reduce distress in newly captive animals, design changes to holding pens, regular replenishment of soils, soil-free rearing, antiseptic washing of water bowls and the use of distilled water, and increased scrutiny and outreach to prevent undue disturbance of the captive animals.

At the inception of the captive breeding program, reintroduction and/or augmentation efforts for the Columbia Basin pygmy rabbit were tentatively planned for the fall of 2003. However, only a minimal number of Columbia Basin pygmy rabbits have remained available for captive breeding efforts, primarily because the captive animals have not been reproducing as well as expected. For comparative purposes, 100 percent of the captive female and male Idaho pygmy rabbits have contributed to reproduction, versus only about 50 percent for both female and male Columbia Basin pygmy rabbits. In addition, 60 percent of the Idaho pairings have resulted in confirmed pregnancies, versus only 17 percent for the Columbia Basin pairings. As a result, while the size and survival of litters were similar between the two groups, the total number of kits produced relative to the number of females in each captive population is over 2.5 times greater for the Idaho females. Behaviorally, Columbia Basin pygmy rabbits also take 8 times longer after initial pairing to begin reproductive behaviors, and spend 5 times longer performing

Table 1. Summary of mortality factors for captive Columbia Basin pygmy rabbits (CBPR) and first-generation intercross (Columbia Basin × Idaho) progeny (I-X) prior to 2004. The number of individuals not federally listed (*i.e.* captured prior to November 30, 2001) is noted in parentheses.

	CBPR 2001	CBPR 2002	CBPR 2003	I-X 2003	
Total number in captivity ⇒ January 1 – December 31	20	35	37	23	
Cause of death ↓					Total
Disease					
Mycobacteriosis	0	6 (6)	6 (6)	0	12 (12)
Coccidiosis	0	5	1	2	8
Cancer	0	1	0	0	1
Pseudomonas Septicemia	0	0	1	0	1
Maternal Neglect	0	0	3	9	12
Trauma	1 (1)	1	0	0	2 (1)
Capture Stress	1 (1)	0	0	0	1 (1)
Unknown	1 (1)	2	2	2	7 (1)
Total mortalities	3 (3)	15 (6)	13 (6)	13	44 (15)
Number attributable to human intervention (incidental take)	2 (2)	1	3	5	11 (2)

reproductive behaviors once started. Finally, the period of successful breeding is roughly 1.5 months longer for the captive Idaho pygmy rabbits (March to early June) compared to the captive Columbia Basin pygmy rabbits (March to mid-April).

Skeletal abnormalities have been detected in 1 wild-caught and 10 captive-born Columbia Basin pygmy rabbits. These abnormalities consist of missing or malformed metacarpal and metatarsal bones of the fore and hind feet, respectively. This unusual condition (brachydactylia) may be a result of inbreeding, and analyses to determine if there is a genetic component to the condition are ongoing. All living Columbia Basin pygmy rabbits and, as feasible, all dead specimens, are radiographed to further document the extent of any abnormalities. Preliminary assessment indicates that this condition may be persistent with the purebred breeding scenarios that are currently available.

There are several lines of evidence from ongoing studies that the Columbia Basin pygmy rabbit is suffering from inbreeding depression, including the poor reproductive

performance and skeletal abnormalities discussed above, possibly diminished testicular function of some males, the potential for increased susceptibility to disease compared to Idaho pygmy rabbits and other lagomorph (rabbit, hare, and pika) species, and declining genetic diversity in the wild and continued loss of genetic diversity in captivity (see below). Given the constraints in the captive breeding program that have come to light over the past few years, reintroduction efforts for the Columbia Basin pygmy rabbit have been postponed until the fall of 2005, at the earliest.

Genetics Management - In 2000, the Washington Department of Fish and Wildlife began population genetic analyses of contemporary pygmy rabbit samples from Washington, Idaho, and Montana, and museum skin samples from Washington and Oregon. Results of the genetic analyses indicate that the Columbia Basin pygmy rabbit is genetically distinct from, and has reduced genetic diversity compared with, other pygmy rabbit populations. Analyses of museum skin samples indicate that the Columbia Basin pygmy rabbit likely also had reduced genetic diversity historically compared to the other populations.

Information regarding the genetic characteristics of the Columbia Basin pygmy rabbit within its historical range is limited. However, based on comparisons of museum and contemporary samples, the genetic diversity of the Columbia Basin pygmy rabbit in the wild has declined over the past 50 years. In addition, the genetic characteristics of the offspring from the single wild-caught pregnant female demonstrate the potentially inbred nature of the last known subpopulation of the Columbia Basin pygmy rabbit. Analyses of these offspring show that the genotypes of each were identical, and this single genotype was nearly identical to their mother's genotype. This strongly suggests that the wild parents of this litter were closely related. Ongoing genetic analyses of the captive-bred animals, initiated in 2001, indicate that the genetic diversity of the Columbia Basin pygmy rabbit has continued to decline in captivity. Furthermore, the average, theoretical genetic relatedness among the captive Columbia Basin pygmy rabbits is estimated to be between full and half siblings. The above results indicate that if breeding is limited to the last known purebred Columbia Basin pygmy rabbits, genetic diversity will likely continue to decline and the population will become increasingly inbred, further imperiling its continued existence.

Due to the poor demographic, behavioral, physiological, and genetic outlook for pure Columbia Basin pygmy rabbit breeding efforts, the Washington Department of Fish and Wildlife undertook initial attempts to intercross Columbia Basin pygmy rabbits with Idaho pygmy rabbits during the 2003 breeding season. The initial intercross breeding

efforts were proposed on an experimental basis to address several basic issues, including the behavioral and reproductive compatibility between the two populations, the extent and nature of any resulting genetic mixing, and the viability of any resulting intercrossed progeny. These initial efforts, which followed the recommendations of a multi-party science advisory group and were conducted in close coordination with the U.S. Fish and Wildlife Service, were undertaken to better assess the full range of possible recovery measures that may be pursued for the Columbia Basin pygmy rabbit.

During the 2003 breeding season, three female Columbia Basin pygmy rabbits were mated with two male Idaho pygmy rabbits at the Oregon Zoo facility. These initial intercross pairings resulted in the production of 5 litters that contained at least 23 offspring. Prior to 2004, 13 intercrossed progeny had died from various causes (Table 1). In addition, one of the surviving intercrossed progeny has similar skeletal abnormalities to those of the purebred Columbia Basin pygmy rabbits. This may have occurred because two of three females used for the initial intercross breeding efforts, one of which is the mother of the affected offspring, are siblings that also display skeletal abnormalities. Given the experimental nature of the initial intercross breeding attempts, these females were considered the most appropriate animals to use for the intercross pairings. Prior to March of 2004 (*i.e.*, onset of the breeding season), nine intercrossed progeny (four female, five male), representing all three attempted pairing combinations, remained alive in the captive breeding program.

Following further coordination with the Science Advisory Group, U.S. Fish and Wildlife Service, and Recovery Team, the Washington Department of Fish and Wildlife broadened the scope of the intercross breeding strategy for implementation during the 2004 breeding season. The current step-wise priorities for the captive breeding program are to conduct purebred pairings of Columbia Basin pygmy rabbits, backcross pairings (*i.e.*, matings between Columbia Basin pygmy rabbits and first-generation intercross progeny), additional first-generation intercross pairings, then experimental pairings (*e.g.*, matings to investigate the skeletal abnormalities). Studies to further investigate the viability, genetic makeup, vigor, and reproductive performance of intercrossed pygmy rabbits are ongoing.

There are three main aims of the intercross breeding strategy:

- 1) Conserve all of the remaining unique genetic characteristics of the Columbia Basin pygmy rabbit (*i.e.*, minimize genetic drift). The genetic distinctiveness of the Columbia

Basin pygmy rabbit is an important component of the taxon's evolutionary legacy, and conserving genetic resources is a primary objective of the U.S. Fish and Wildlife Service in its implementation of the Endangered Species Act (USFWS 1996). Intercross breeding currently represents the most practicable approach to ensure that the unique genetic resources still inherent to the Columbia Basin pygmy rabbit are conserved.

2) Ensure that the Columbia Basin pygmy rabbit population contains enough genetic diversity to remain viable for the foreseeable future (*i.e.*, minimize inbreeding). Inbreeding depression is currently a significant threat to this distinct population segment. Increasing the population's genetic diversity through intercrossing with Idaho pygmy rabbits could help ameliorate the negative effects potentially due to inbreeding, including poor reproductive performance and physiology, skeletal abnormalities, and diminished immune response.

3) Ensure that the unique genetic characteristics of the Columbia Basin pygmy rabbit do not become attenuated through over-representation of genetic material from foreign pygmy rabbit populations (*i.e.*, minimize the potential for outbreeding depression). While there is little empirical evidence currently available to support this last aim, the unique genotype of this distinct population segment, which has evolved in the Columbia Basin ecosystem, may include adaptive advantages for the taxon within this ecological setting. To the extent possible, maximizing the genetic representation of the Columbia Basin animals within the captive population may hold important implications for recovery of the species in the region.

The extent to which intercross breeding is appropriate will be a balance between the above aims. A purebred strategy remains a possibility for the program, at least until the 2005 breeding season. However, the available information indicates that aim #1 is not being met and aim #2 likely can not be met given the captive population's present status. Unless a sufficient number of additional wild, reproductively active Columbia Basin pygmy rabbits can be secured for the captive breeding program, intercross breeding will become a key component of recovery efforts for the population.

Additional information that will bear on what the appropriate level of intercrossing might be will be generated during the 2004 breeding season and further assessed through the ongoing studies. Following these additional assessments, the science advisory group will provide an initial estimate of how many and what types of animals will be needed to support an effective captive breeding program. No intercrossed pygmy rabbits will be released to the wild prior to completion of the additional assessments and further

clarification of the specific objectives to be met by the intercross strategy. This additional information will be provided in a Reintroduction and Augmentation Plan that is currently being developed (see below). Release of any captive Columbia Basin pygmy rabbits that are not needed for future breeding efforts (*e.g.*, genetically redundant, non-reproductive) will also be in accordance with the Reintroduction and Augmentation Plan. If the capacity of the existing breeding facilities becomes limited, some captive pygmy rabbits may be held at other zoos for environmental education and awareness, as appropriate and in accordance with the provisions of Federal Recovery Permit TE-050644-3 (USFWS 2003b). If additional captive breeding facilities are needed for the program, they will be developed prior to the 2005 breeding season.

Other Efforts - Regardless of whether a purebred or intercross strategy is eventually adopted for recovery efforts, locating and capturing additional Columbia Basin pygmy rabbits that may remain in the wild would improve the recovery outlook for this distinct population, and is currently a high priority for the program. The Washington Department of Fish and Wildlife, in cooperation with the U.S. Fish and Wildlife Service, has ongoing efforts to survey for and, as opportunities may arise, capture additional Columbia Basin pygmy rabbits so that they can be included in the captive breeding program.

Currently, the number of additional Columbia Basin pygmy rabbits considered appropriate to remove from the wild is 30. This preliminary estimate is based on the original program goal of capturing 20 reproductively active Columbia Basin pygmy rabbits, and considering that only about 40 percent of the 21 founding animals have actually contributed to reproduction (4 of 11 females, 4 of 10 males). Thirty additional wild-caught animals is a minimum estimate for several reasons, including: 1) it is now apparent that the genetic diversity of the Columbia Basin pygmy rabbit in the wild had been declining over the past several decades; 2) the contemporary wild population is likely suffering from inbreeding; 3) the captive population has continued to lose genetic diversity; and 4) the reproductive success of the population appears to have declined commensurately. The actual number of additional Columbia Basin pygmy rabbits that may be appropriate to remove from the wild will be continually reassessed if and when any additional animals are identified and may be potentially secured for the captive breeding program.

If the captive breeding program is successful, the intent is to release captive-bred Columbia Basin pygmy rabbits (to include intercrossed progeny, as appropriate) into the highest priority recovery emphasis areas on Federal, State, and willing landowner

properties to begin the process of reestablishing a viable wild population. Recovery emphasis areas are sites that could currently, or potentially through appropriate management efforts, support a viable subpopulation of Columbia Basin pygmy rabbits. Specific criteria addressing the necessary size and habitat conditions of possible recovery emphasis areas will be further assessed by the recovery team as recovery planning progresses and documented in the Reintroduction and Augmentation Plan.

The Washington Department of Fish and Wildlife currently manages the Sagebrush Flat Wildlife Area, which totals approximately 1,556 hectares (3,840 acres), to support future reintroduction efforts for the Columbia Basin pygmy rabbit. The Sagebrush Flat site falls within the broader central Moses Coulee area of southern Douglas County. Other conservation lands in the central Moses Coulee area are managed by The Nature Conservancy, and total approximately 6,888 hectares (17,000 acres). The Nature Conservancy, in cooperation with the Lancaster family, has also acquired or obtained easements on approximately 1,013 hectares (2,500 acres) of high quality shrub steppe habitat, referred to as the TNC/Lancaster Site, in the Beezley Hills area of northern Grant County. Other conservation lands in the broader Beezley Hills area total approximately 8,509 hectares (21,000 acres). As appropriate, these lands will be managed to support recovery efforts for the Columbia Basin pygmy rabbit. Portions of the remaining shrub steppe habitat throughout the population's historical range are administered by various State and Federal agencies and private conservation interests. Conservation measures for the Columbia Basin pygmy rabbit may also be considered in future management programs on these lands.

The Washington Department of Fish and Wildlife has undertaken initial efforts to identify and prioritize recovery emphasis areas throughout the population's historical range. These initial efforts primarily considered the soil types, general habitat conditions, existing land uses, site impacts, land ownership and management authority, and minimum size estimates of candidate sites. A number of areas have been identified for further consideration by the recovery team regarding their potential to support long-term recovery objectives for the Columbia Basin pygmy rabbit. Criteria to further assess the sites will include ranking categories addressing habitat conditions, necessary protection or enhancement measures, surrounding land use and ownership patterns, management flexibility, and historical occupation by Columbia Basin pygmy rabbits. Two of the areas, the Sagebrush Flat and TNC/Lancaster sites discussed earlier, have also been identified by the team as top priority sites to consider for near-term recovery objectives, including initial reintroduction efforts for the Columbia Basin pygmy rabbit.

The Washington Department of Fish and Wildlife, in coordination with the science advisory group, U.S. Fish and Wildlife Service, and recovery team, is currently developing a Reintroduction and Augmentation Plan that will identify specific procedures for release and monitoring of captive-bred Columbia Basin pygmy rabbits. This program will be largely based on the ongoing investigations of Idaho pygmy rabbits and the results of other ongoing recovery planning efforts for the Columbia Basin pygmy rabbit (*i.e.*, captive breeding, genetics management, evaluation of recovery emphasis areas). The timing and specific objectives for reintroduction and/or augmentation efforts will be further developed as recovery planning progresses.

Specific criteria addressing the number, size, and configuration of the wild Columbia Basin pygmy rabbit subpopulations necessary for recovery pursuant to the Endangered Species Act have not yet been determined. However, no pygmy rabbits within the captive rearing facilities will be counted toward recovery of the population. As with potential recovery emphasis areas (see above), specific criteria addressing the necessary subpopulations will be further assessed by the recovery team as recovery planning progresses and documented in the draft Federal recovery plan.

We are currently assisting the Foster Creek Conservation District with development of a voluntary, county-wide habitat conservation plan for private agricultural interests throughout Douglas County. When completed, the plan will likely include protection measures for the Columbia Basin pygmy rabbit that can be implemented by private landowners. These voluntary measures on private lands would complement other, ongoing conservation efforts throughout the region.

INTERIM RECOVERY RECOMMENDATIONS

Recovery Priority Number: 3, on a scale of 1C (highest) to 18 (lowest) (USFWS 1983a and 1983b). This ranking is based on a high degree of threat, high potential for recovery, and classification as a distinct population segment under the Endangered Species Act (16 United States Code 1531 *et seq.*).

Although the degree of threat is currently high, the captive breeding program and intercross strategy are specifically targeted at successfully addressing the immediate threats to the population, and numerous specific efforts (*e.g.*, land acquisitions, management agreements) are focused on addressing the long-term recovery issues. We consider the potential for the recovery of the Columbia Basin pygmy rabbit to be relatively high, since amongst other factors the species

reaches reproductive maturity quickly, generally produces several offspring per reproductive effort, our knowledge of captive management of the animals is constantly improving, and we have already carried out a successful reintroduction of captive-bred pygmy rabbits using Idaho animals as surrogates.

Recovery Goal: The goal of the Federal recovery effort addressed by this outline is to help create proactive conservation conditions that will allow the Columbia Basin pygmy rabbit to be reclassified to threatened and, ultimately, to be removed from the List of Threatened and Endangered Species pursuant to the Endangered Species Act.

Recovery Objectives

- Stabilize the genetic profile, ensure the reproductive success, and maintain a sufficient number of Columbia Basin pygmy rabbits in captivity to accommodate future reintroduction and augmentation efforts.
- Inventory, prioritize, and manage potential release sites to provide an appropriate quantity and quality of shrub steppe habitats capable of supporting Columbia Basin pygmy rabbit subpopulations.
- Reestablish an appropriate number of viable subpopulations of Columbia Basin pygmy rabbits in the wild through cooperative reintroduction efforts with participating and neighboring landowners and managers.
- Sufficiently abate threats to the Columbia Basin pygmy rabbit subpopulations in the wild to ensure a high probability of the population's persistence over the next 100 years.

Recovery Strategy

There are four distinct areas that require comprehensive development and coordination to achieve the above recovery objectives for the Columbia Basin pygmy rabbit. These four areas are:

- 1) ensuring that the captive breeding program is secure and successful;
- 2) implementing measures to reestablish viable subpopulations in the wild;
- 3) maintaining a sufficient number of subpopulations in the wild to ensure that the Columbia Basin pygmy rabbit is sufficiently resilient to withstand foreseeable threats; and
- 4) making sure resources are available to engage the full range of potential stakeholders and interested parties in voluntary, proactive conservation efforts.

More specific strategies for each of these four areas are presented below.

- **Captive Breeding and Genetics Management** (WDFW 2004)
 - Maximize conservation of the Columbia Basin pygmy rabbit's unique genetic profile.
 - Implement intercross breeding measures so as to ensure that the Columbia Basin pygmy rabbit population has sufficient genetic diversity to remain viable for the foreseeable future, while minimizing the genetic representation of foreign pygmy rabbit populations.
 - Implement measures to ensure the reproductive success of adult male and female Columbia Basin pygmy rabbits while in captivity and following release to the wild.
 - Maintain an appropriate number and type of Columbia Basin pygmy rabbits in captivity for breeding efforts, and produce enough additional animals to facilitate future reintroduction and augmentation efforts.

- **Reintroduction and Augmentation** (WDFW, in prep.)
 - Identify, inventory, and prioritize all possible recovery emphasis areas.
 - Undertake management to prepare the highest priority area(s) to receive captive-bred Columbia Basin pygmy rabbits.
 - Design and implement investigations to improve the information base and conservation actions undertaken for the Columbia Basin pygmy rabbit.
 - Implement techniques for releasing captive-bred Columbia Basin pygmy rabbits to maximize the likelihood of survival following release.
 - Undertake regular surveys to monitor the status of Columbia Basin pygmy rabbit subpopulations in the wild.
 - Develop protocols to assess the feasibility and conservation benefits of adding any newly located, wild Columbia Basin pygmy rabbits to the captive breeding program, translocating them to recovery emphasis areas, and/or managing them in place.

- **Recovery Management** (USFWS, in prep.)
 - Establish habitat parameters for long-term management of recovery emphasis areas, and implement measures to maintain the areas within the established parameters or to restore them following significant disturbances.
 - Establish protocols for monitoring and managing sites adjacent to recovery emphasis areas that fully incorporate cooperative agreements and other voluntary conservation planning measures with neighboring landowners and managers.
 - As appropriate, implement measures to protect Columbia Basin pygmy rabbits from direct threats due to fire, livestock and human activities, and excessive incidence of predation and disease.

- Establish an appropriate number, size, and configuration of Columbia Basin pygmy rabbit subpopulations so that the population as a whole will be sufficiently resilient to any foreseeable threats.
 - At the time that all other recovery criteria for the Columbia Basin pygmy rabbit are met, ensure that any necessary regulatory mechanisms are in place so that the population will not again become threatened or endangered. A minimum 5-year, post-delisting monitoring plan should be developed for implementation prior to delisting of the Columbia Basin pygmy rabbit pursuant to the Endangered Species Act.
- **Outreach and Stakeholder Involvement** *responsible party(ies) noted in parentheses*
- Develop an outreach plan and informational resources (*e.g.*, web sites, brochures, Question and Answer sheets) to help disseminate information to all interested parties prior to implementation of recovery actions (Recovery Team).
 - Be available to meet with concerned parties to facilitate information exchange, as requested (Recovery Team).
 - Undertake survey and monitoring efforts with willing landowners to help establish baseline conditions for non-Federal properties (Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service).
 - Conduct ongoing efforts to secure safe harbor agreements, or other voluntary conservation planning measures, with willing landowners and managers (U.S. Fish and Wildlife Service).
 - Conduct public meetings and other formal outreach measures to engage the full range of potential stakeholders and interested parties (U.S. Fish and Wildlife Service).

RECOVERY PLANNING AND PROJECTED TIME LINES

Federal Recovery Plan Coordination and Preparation

The U.S. Fish and Wildlife Service convened a recovery team in 2003 to oversee the development of a draft Federal recovery plan for the Columbia Basin pygmy rabbit (see Appendix A for recovery team membership, affiliation, and expertise). The draft Federal recovery plan will be closely coordinated with existing State recovery planning efforts, which are being implemented by the Washington Department of Fish and Wildlife (WDFW 1995, 2001, 2003, 2004).

The Washington Department of Fish and Wildlife convened a science advisory group in 2000 to assist with development of their captive breeding, genetics management, and reintroduction and

augmentation programs for the Columbia Basin pygmy rabbit. The Washington Department of Fish and Wildlife has also convened a multi-party reintroduction and augmentation working group. The recovery team and State working groups include personnel from the captive breeding facilities, academic experts, State and Federal land management agency staff, contributing landowners, agricultural interests, and representatives from non-governmental organizations. In coordination with the above participants, the U.S. Fish and Wildlife Service bears the primary responsibility for developing the draft Federal recovery plan.

Other potential stakeholders in Columbia Basin pygmy rabbit recovery efforts, including local government interests, industry groups, neighboring landowners to possible reintroduction sites, and the general public, will have opportunity for involvement through the Federal recovery planning process. As the recovery team finds appropriate, this process may include formation of team subcommittees, coordination with consulting experts, and meetings with interested parties to facilitate information exchange. Pursuant to statutory and administrative responsibilities for Federal recovery efforts, the U.S. Fish and Wildlife Service will also disseminate information to, and solicit input from, all interested parties concerning implementation of specific recovery actions undertaken for the Columbia Basin pygmy rabbit.

➤ **Responsible Parties and Timing**

- U.S. Fish and Wildlife Service lead agency for plan development.
- Preliminary draft plan to be distributed for internal technical review and input through the Columbia Basin Pygmy Rabbit Recovery Team, and expert review as appropriate, prior to March 1, 2005.
- Conduct public meetings and other formal outreach measures to engage the full range of potential stakeholders and interested parties (U.S. Fish and Wildlife Service).
- Draft plan to be completed prior to July 1, 2005, and distributed to all interested parties and subject to review and input through agency, public, and peer review process, as appropriate.
- Plan to be finalized prior to July 1, 2006, and distributed to all interested parties.
- Minor updates to plan made as new information becomes available.
- Significant updates and plan revisions subject to review through the recovery team, participating agencies, stakeholders and other public interests, and peer review process, as appropriate, prior to final U.S. Fish and Wildlife Service approval.

Other Recovery Planning Efforts

➤ Captive Breeding and Genetics Management Plan

- Washington Department of Fish and Wildlife lead agency for plan development.
- Draft plan reviewed by science advisory group and recovery team.
- Final plan approved by the U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife in May, 2004, in accordance with Endangered Species Act section 6 authority and section 10 Recovery Permit TE-050644-3.
- Plan distributed to all interested parties upon completion.
- Plan to be updated and approved by March 1 annually, and significant updates to be distributed to interested parties.

➤ Reintroduction and Augmentation Plan

- Washington Department of Fish and Wildlife lead agency for plan development.
- Draft plan to be distributed for review and input through science advisory group and recovery team prior to January 15, 2005.
- Plan to be finalized prior to March 1, 2005, and subject to U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife approval in accordance with Endangered Species Act section 6 authority and section 10 Recovery Permit TE-050644-3.
- Plan to be distributed to all interested parties upon completion and future updates.
- Plan to be updated and approved by March 1 annually.
- Depending on results of 2005 breeding season, release of captive-bred Columbia Basin pygmy rabbits to address reintroduction, augmentation, and/or experimental objectives to take place after September 1, 2005, as appropriate.

Approval: _____

ACTING Regional Director, Region 1
U.S. Fish and Wildlife Service

11/30/04

Date

Citation

U.S. Fish and Wildlife Service. 2004. Recovery Outline for the Columbia Basin Distinct Population Segment of the Pygmy Rabbit (*Brachylagus idahoensis*). Portland, Oregon. 25 pp.

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[WDFW] Washington Department of Fish and Wildlife. In prep. Draft Columbia Basin Pygmy Rabbit Reintroduction and Augmentation Plan. Olympia, Washington.

APPENDIX A
Columbia Basin Pygmy Rabbit Recovery Team

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