RED WOLF RECOVERY PLAN

Prepared By

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PART I. INTRODUCTION

The red wolf (Canis rufus) is a little-known North American canine that once ranged over the Southeastern United States, from the Atlantic Ocean to central Texas, and from the Gulf of Mexico to central Missouri and southern Illinois. It was first described by Bartram (1791) in the 18th centruy and was believed to have consisted of three subspecies, Canis rufus floridanus, Canis rufus rufus, and Canis rufus gregoryi. The eastern subspecies (C. r. floridanus) became extinct early in this century (Young and Goldman, 1944). The western subspecies (C. r. rufus), thought by McCarley (1962) to be a hybrid form resulting from breeding the coyote (C. latrans) and Canis rufus gregoryi, and therefore not a valid taxon, is believed to have recently become extinct in the pure form (Carley, 1975). Recent findings indicate that the only extant subspecies (C. r. gregoryi), once occurring from eastern Texas to eastern Mississippi, for all practical purposes is extinct in the wild in the pure form (McCarley and Carley, 1979).

Although the red wolf was once found in numerous habitats throughout the Southeastern United States, its range after 1970 was restricted to less than 900 square miles of extreme southeast Texas and less than 800 square miles of extreme southwest Louisiana. This range can be roughly described as the area south of Interstate Highway 10 in Jefferson and Orange Counties in Texas, and in Cameron and Calcasieu Parishes, Louisiana, west of Calcasieu Lake. By the early 1970's they were found in only limited numbers in the southernmost reaches of even this area. Hybrids and coyotes were in the majority (McCarley and Carley, 1979).

The primary habitats within this area are coastal prairies and marshes. The prairie extends as a thin band of relatively high ground between the coastal marsh and the extensive forest of east Texas and western Louisiana. Forested lands extend northward from a line drawn roughly from Anahuac, Texas, to the northwest corner of Jefferson County and then eastward into Louisiana along Interstate Highway 10. Wooded areas also extend along bayous that traverse the prairie. Elevations within the area vary from 0 to 25 feet above sea level. Most of the coastal prairie, once characterized by tall bunchgrasses and the site of some of the earliest ranches in Texas, is in private ownership and is farmed intensively. The leading agricultural products of the area are cattle, rice, and soybeans. Petroleum production is widespread and the area is becoming heavily industrialized by the associated petrochemical complex.

The coastal marsh, characterized by salt-tolerant grasses and sedges, starts as a narrow band along the northern edge of East Bay in Chambers County, Texas, and rapidly expands eastward. In general, it stretches from the Gulf of Mexico northward to a line starting at the tip of the peninsula separating Trinity and East Bays in Texas and extends eastward slightly north of and paralleling the Intracoastal Waterway to Calcasieu Lake, Louisiana. Most of Cameron Parish, west of Calcasieu Lake, is coastal marsh. The marsh, most of which is privately owned, is noted for its abundance of alligators, fur bearers such as nutria, muskrats, and raccoons, and its large flocks of wintering snow geese. Petroleum related activity is widespread. Oil company roads, raised "cow walks," and levees permit ranchers to move herds of cattle into the area for winter grazing. Large areas of the marsh are burned each spring to remove dead vegetation and stimulate new growth. Waterowl hunting is popular during the winter months (McCarley and Carley, 1979).

The climate is subtropical. A prevailing southeasterly wind maintains high relative humidity. The average annual rainfall is approximately 60 inches, while temperatures range from the high teens to 100° F. The area is subject to hurricanes. Thundershowers are common during the summer months, and days-long rainy periods occur in the winter when cold air masses encounter the moist Gulf air. Biting and sucking insects abound most of the year.

The primary habitat requirement for the red wolf in its final range was heavy vegetative cover. Radio telemetry studies and field observations made during the Red Wolf Recovery Program indicated that the heavy cover provided along bayous and in fallow fields constituted the primary resting and denning areas of the species. During active periods, the animals ranged out from these areas into rice fields and pastures. Oil company access roads, dikes, and canal levees provided the primary travel routes through the area. It was not unusual to locate wolf sign far from cover along well-traveled roads (Carley, 1975). Canids of the area are often struck by vehicles when crossing major highways.

Wolves did not appear to be common in the coastal marshes. Although they ventured into the marshes along cattle walkways and oil field roads, the area did not appear suitable for habitation throughout the year. ~~Wolves~~ Wolves were more evident in the marshes during the winter when mosquito populations and vegetative production were reduced.

The details of the life history of the red wolf are lost in antiquity since no significant studies were made when viable wild populations still existed. Today such studies are limited because populations of wolves can no longer be found in the wild. The following generalities have been arrived at through literature surveys, personal communications, and the experiences of Red Wolf Recovery Program biologists.

The social structure of the red wolf is probably not as regimented as the pack system reported for gray wolves by Burkholder (1959), Mech (1966 and 1970), and others, or as unfettered as that suspected for coyotes (Knowlton, 1972; Riley and McBride, 1972). T.E. "Doc" Harris (pers. comm.) stated that the red wolves he observed in the 1950's exhibited a strong family bond. Howling surveys and radio telemetry studies conducted by Red Wolf Recovery Program personnel often sighted lone wolves; however, groups of two or three were more common. The largest groups encountered consisted of seven animals. Groups tended to be larger in the fall when the current year's offspring were traveling with their parents.

Reports of "strong" pair bonding in gray wolves are numerous (Mech, 1970; Fox, 1975). The relationship of mated red wolves in the wild is not known. Translocated wolves, thought to be naturally mated pairs due to the circumstances of their capture, have stayed together. In captivity, paired red wolves appear to be fond of each other, often play together, and greet each other through typical canine mouthing and nuzzling. Wild-caught adult wolves paired only 2 to 3 months prior to the breeding season have produced pups in captivity. A female captured with her suspected natural mate in October was placed in a pen with another pair of animals in January, her mate having died in December. The other pair of animals had been together since November; however, the male bred the new member of the trio, producing three pups. There was no indication that both females had been bred. All three adults tended the pups; no aggresssive actions were observed between the two females. In another instance, a pair of wolves that had been together for several years, producing one litter of pups, were separated and placed with different mates. Although only 40 feet apart and able to view his former mate, the male bred with his new mate. There was no indication that his original mate was bred by her new companion.

As in the coyote, gray wolf, and dog, the gestation period for red wolves is 60 to 63 days. Pups are born in April or May. Thus far, litter sizes in captivity have ranged from two to eight pups with an average of 4.6 per litter. Nowak (1972) reports accounts of as many as 12 pups.

As reported by Nowak (1972), earlier accounts state that red wolves have been known to establish dens in hollow tree trunks, stream banks, former dens of other animals, and in coastal areas on sand knolls. Riley and McBride (1972) report denning occurring in drain pipes, culverts, and the banks of irrigation ditches. Recovery program biologists observed den excavations in sand knolls on the coastal prairie; however, no evidence of pups in the dens was ever found. A den located in a brush pile created during the construction of a golf course was used to rear a litter of hybrid pups. Due to poor drainage, a high water table, and commonly heavy showers along the coast, some of the dens were flooded. As evidenced by Riley and McBride (1972), in the flood-prone heavily vegetated habitat, most pups were probably born in grass "nests" located in areas of heavy cover. A diverse terrain would provide additional den sites and better protect the young.

Red wolves in captivity have excavated their own dens, used man-made dens, or simply had their pups in shallow depressions, the latter case being common even when man-made dens were provided. When the keepers became concerned about the welfare of the captive-born pups during heavy rains and moved them to the dens provided, the female often returned the pups to their shallow nest. No captive-born pups are known to have died as a result of exposure to weather; however, without the protection of a den, several pups were lost to avian predators.

The red wolf is an opportunistic predator, and as such, tends to eat prey species that present the greatest opportunity for capture. As reported by Stutzenbaker (1968), Russell and Shaw (1971), Riley and McBride (1972), and Shaw (1975), the common prey species utilized by wild canids in southeast Texas and southwest Louisiana are nutria, swamp rabbit, cottontail rabbit, rice rat, cotton rat, muskrat, and raccoon. Historically, red wolves are reported to have killed razorback hogs (Young, 1946), and deer (Young and Goldman, 1944). In addition, scats examined from wolves translocated to Bulls Island of the Cape Romain National Wildlife Refuge in South Carolina contained fox squirrels, American coot, and parts of unidentified birds and small mammals. Red wolves, like coyotes and gray wolves, are also carrion feeders.

Red wolves will prey on domestic livestock; however, such predation appears to be based on opportunity. Young calves less than 6 to 8 weeks of age are susceptible to predation if not attended by a cow. Small barnyard animals, if allowed to run free, are also subject to predation. Recovery program biologists observed red wolf predation on young calves, incapacitated cows, pigs, and barnyard fowl. The lack of a pack hunting structure and an abundance of smaller prey preclude the possibility of red wolves killing grown healthy cattle. Carrion feeding may lead some observers to conclude that livestock predation is a serious problem. Riley and McBride (1972) reported that ranchers in the range of the red wolf disagreed as to the seriousness of the wolf as a killer of cattle, a disagreement that never existed with the gray wolf. They interpreted the fact that there was disagreement among the ranchers as meaning that red wolves are not a serious predator of cattle.

Shaw (1975) reported an average home range of 17 square miles for two female and five male canids involved in a telemetry study in the red wolf range in 1972. Riley and McBride (1972), by systematic tracking of three adult canids for 1 year, estimated the home range of a red wolf to be 25-50 square miles. In a telemetry study conducted in 1974, recovery program biologists concluded that male red wolves ranged over an area of about 45 square miles, while the range of females averaged somewhat smaller (25-30 square miles) (Carley, 1975). Sub-adult home ranges appeared larger than those of adult animals. The home range of a red wolf is undoubtedly dependent upon the habitat in which it resides, the terrain, and the availability of prey. In southeast Texas and southwest Louisiana, it was evident that the wolves often traversed areas larger than required for the purposes of obtaining food. The general pattern appeared to be one of remaining in a relatively small area for a week to 10 days, with occasional overnight roundtrip explorations to other areas. Then the animal moved several miles to a new area where it remained for another week to 10 days. Such movements may have been the result of depleted food supplies in previously hunted areas. After several such relocations the animal usually returned to the original area occupied. A pattern similar to the above was also observed in translocated red wolves (Carley, In press).

The life span of the red wolf in coastal southeast Texas and southwest Louisiana was short. The majority of the animals captured was estimated to be less than 4 years of age. Occasional animals were found that appeared to be 7 to 8 years old. In captivity, with good care, the life span of red wolves should be about 14 years, similar to that of captive gray wolves or dog breeds of the same general size.

The initial decline of the species is believed to have been caused by increases in the human population, changes in land use during the early 1900's, and predator control activities. As the species declined coyotes rapidly moved into western portions of the red wolf's range. In areas where some red wolves survived, reproductive isolation between the red wolf and coyote broke down and led to hybridization between the two species. This in turn led to the establishment of a hybrid which invaded the final range of the red wolf in southeast Texas and southwest Louisiana.

The red wolf was listed as a Federally Endangered species on March 11, 1967, and a limited Red Wolf Recovery Program was established that same year. Following passage of the Endangered Species Act of 1973, The red wolf was selected for priority treatment. At that time an expanded program to save the species was initiated by the U.S. Fish and Wildlife Service in cooperation with the Louisiana Wildlife and Fisheries Commission and the Texas Parks and Wildlife Department. Early program findings confirmed that the red wolf was confronted by loss of habitat, loss of young to parasites, persecution by man, and an irreversible dilution of the gene pool by invading coyotes (Carley 1975). By late 1975, it was concluded that it was no longer feasible to preserve the red wolf gene pool in its limited range in Texas and Louisiana. Once this decision had been made, the prime objectives of the program became to: 1) locate and capture as many red wolves as possible in an attempt to preserve the species in captivity, and 2) explore the feasibility of reestablishing red wolf populations in areas of the species' historic range. It was recognized by all concerned that the active removal of specimens from Texas and Louisiana would hasten the demise of the species in the wild. However, since extinction in the two States appeared to be inevitable, removal of the few remaining wolves was determined to be the only practical means of preservation.

In November 1973, as part of the overall Red Wolf Recovery Program, a Captive Breeding Program was established through the Metropolitan Park Board of Tacoma at the Point Defiance Zooligical Garden in Tacoma, Washington. The objectives of the program were to: 1) certify the genetic purity of wild-caught wolves; 2) increase the number of genetically pure red wolves in captivity, and 3) maintain a continuing red wolf gene pool for reestablishment of the species in the wild and/or distribution to selected zoological gardens.

Because of hybridization and the resultant sympatric occurrence of specimens ranging in appearance from coyotelike to wolflike, the Red Wolf Recovery Program has had to be quite selective in choosing specimens that represent the red wolf subspecies, C. r. gregoryi. Minimum standards were established for the selection of adult male and female wild red wolves used for captive breeding. These standards included the following criteria:

	Male	Female
Skull length	215 mm	210 mm
Zygomatic breadth	110 mm	110 mm
Weight	50 lbs (22.5kg.)	42 lbs (19 kg.)
Total length	53 in (1,346 mm)	51 in (1,295 mm)
Hind foot length	9 in (229 mm)	8 3/4 in (222 mm)
Ear length	4 3/4 in (120.6 mm)	4 1/2 in (114.3 mm)
Shoulder height	27 in (685.8 mm)	26.5 in (673.1 mm)
Brain/Skull Ratio	23	23.5

As a result, some wolflike specimens that were rejected may have been actual red wolves, but on the other hand, most of the hybrids were excluded from the program. Therefore, the animals retained, on the average, may appear more wolflike than some historically genetically pure red wolf specimens. These

animals, however, undoubtedly contain genetic material representing the natural variability exhibited by the wild historic red wolf populations. The taxonomic variability of the historic population is not recorded in the literature.

Although the identity of wild-caught wolves has been determined by the best available techniques, (standard taxonomic measurements, skull x-ray, electrophoretic and vocalization analysis) the possibility of wolflike hybrids being among the captive animals still exists. At this time identification of the specimens can be made only through examination of their offspring. Evaluation of the first four litters born in captivity determined that at least two of the litters were from pure red wolves. The other two litters contained possible indications of dog hybridization (Carley, unpub. data).

Captive-born animals are examined shortly after birth and again after reaching skeletal maturity. In order to reduce the cost, time, and effort involved in holding and examining these animals, studies should be initiated or continued into other means of certification that could expedite the ability to recognize pure red wolves without the necessity of maintaining offspring for this length of time. These techniques might involve the use of molecular or chromosome/gene/DNA comparisons.

As of July 1981, there were 12 wild-caught wolves, 12 captive-born wolves, and 36 wolflike native born animals in the program. Of these 36 wolflike animals, 6 are known to be hybrids. Seventeen of them, born in 1980, have tentatively been identified as red wolves. The remaining 13, born in the spring of 1981 will be examined initially during August.

One wild-caught animal is located at Winnie, Texas. Two captive-born animals are at the Audubon Park Zoo in New Orleans. The remainder are at Tacoma. Two captive-born animals are scheduled to go to the Wild Canid Survival and Research Center in St. Louis, Missouri, in the fall of 1981. The first litters of wolf pups were born at the Point Defiance Zoo in May, 1977.

Experimental reestablishment of mated pairs of adult wild-caught red wolves has been tested on Bulls Island of the Cape Romain National Wildlife Refuge near Charleston, South Carolina (Carley, 1979; Carley In Press). The results indicate it is possible to reestablish adult wild-caught red wolves in selected habitats in the wild. Observations on the opportunistic nature of wild canine species and their learning abilities, as well as limited experiments with wild-caught but captive-reared pups in Texas, also indicate that the establishment of captive-reared specimens in the wild is feasible.

This recovery plan was prepared with the consideration that Region 2 of the U.S. Fish and Wildlife Service had already determined that, for all practical purposes, genetically pure red wolves were extinct in the wild by the autumn of 1980. Complete recovery of the species can only be accomplished by maintaining a captive population and by reestablishing self-sustaining wild populations that will once again be subject to the laws of natural selection and the social structure established by such populations. Only in this way can the red wolf remain a representative member of our native mammalian fauna and become better understood through observations of its behavior in natural ecosystems.

PART II. RECOVERY

A. Recovery Objective

The ultimate goal of the recovery plan is to return the red wolf to non-endangered status. However, quantification of this goal is not considered feasible at present because of various unknowns.

Full recovery of the species, that is to the point where it could be removed from the Federal list, would require the establishment of viable self-sustaining populations throughout a major portion of its former range. This may be an unattainable goal.

At this time there is insufficient information on the species to determine whether viable self-sustaining populations can be established outside of strictly controlled management areas. The circumstances contributing to the red wolf's endangerment (hybridization with other canids) adds an uncertainty to recovery actions not found for other listed species that have become endangered because of loss of habitat, overutilization, pesticide use, etc. The team feels that with a properly structured family group the problem of hybridization can be eliminated, but admittedly this is conjecture, and will remain conjecture unless or until tested in reestablishment efforts.

Because of these uncertainties no numerical goal for recovery has been established at this time, either for a total number of animals or for the number of locations with self-sustaining populations. As additional information becomes available the recovery plan will be revised to include more specific goals.

poor logic!

This is no reason to not establish goals for recovery. What is needed for recovery has nothing to do with these unknowns! Once goals are established the recovery plan should set out to reach this goal. Perhaps the first step will be research or experimental release to obtain the answers to the unknowns. However once data is obtained to answer these unknowns we should be able to evaluate whether the recovery goal can be achieved. If not, we should write the specie off as a wild population. If the goal can be achieved, praised.

B. Step-down Outline

Recovery activities have been divided into two principal objectives: (1) the reestablishment of self-sustaining wild populations within the species' historic range, and (2) the establishment and maintenance of captive breeding stock.

The latter objective has two subobjectives; the primary one being the production of pure red wolf stock for use in the reestablishment effort, and a secondary one of providing pure red wolves for distribution to zoos and other facilities throughout the nation. These wolves would serve as a reserve gene pool to assure genetic survival of the species in the event initial reestablishment efforts are unsuccessful.

Please note that in the following outline tasks within the same level do not necessarily reflect chronological sequence.

1. Reestablish self-sustaining wild populations of red wolves within their historic range.
    - 1.1 Implement reestablishment proposals.
        - 1.11 Prepare reestablishment proposals.
        - 1.12 Establish requirements of suitable sites.
        - 1.13 Evaluate and select potential release sites.
            - 1.131 Estimate Canis' composition and density.
            - 1.132 Determine feasibility of removing Canis.
            - 1.133 Determine extent of potential problems with parasites and diseases.
            - 1.134 Determine public relations aspect of reestablishment.
            - 1.135 Determine compatability of species to ecosystem.
    - 1.2 Reevaluate reestablishment sites.
    - 1.3 Reintroduce red wolves at other locations as appropriate.

2. Propagate pure red wolves suitable for the reestablishment of the species in the wild.

   2.1 Establish and maintain captive breeding facilities.

   2.2 Maintain integrity of broodstock.

   2.3 Certify red wolves and select breeding pairs.

   2.4 Help assure proper implementation of breeding program through American Association of Zoological Parks and Aquariums (AAZPA).

   2.5 Maintain captive gene pool in government supported facilities until survival of the species is assured in the wild.

C. Narrative

Project Objective 1: Reestablish self-sustaining wild populations of red wolves within their historic range.

1.1 Implement reestablishment proposal(s).

Carry out activities identified in the reestablishment proposal, including post-release monitoring of the wolves and the ecosystem. If necessary modify management techniques or terminate the program by removing the animals, based on evaluation of wolf movements, reproductive success, hybridization factors, public relations, adaptation to the ecosystem, or impacts to the ecosystem.

1.11 Prepare reestablishment proposals.

These documents should take the form of a "Memorandum of Understanding" between the Fish and Wildlife Service and the landholding agency, and should outline on a site specific basis all of the requirements for the reestablishment program, and each agency's authority, capability, and responsibility to carry out these requirements. Presumably, it would address such topics as the preparation of an environmental impact statement (if needed), an information/education program and/or public meetings or hearings, regulatory changes (if needed), Canis control, pre-release training or conditioning of the animals and post-release monitoring, evaluation of the program, management, etc.

Following completion and concurrence by the Service and the landholding agency, it should be submitted to the State game and/or regulatory agency for their review and comments or

suggestions prior to implementaton of any facet of the proposal.

1.12 Establish requirements of suitable sites.

Based on existing knowledge of home range, prey species, hybridization, etc., establish criteria for reestablishment requirements.

1.13 Evaluate and select potential release sites.

A minimum of two sites most closely meeting the established criteria should be selected for initial reestablishment efforts, which should be considered experimental.

1.131 Estimate Canis' composition and density.

Determine, insofar as possible from available information, the estimated numbers and species of canines ?, and anticipated conflicts from them.

1.132 Determine the feasibility of removing Canis.

1.133 Determine extent of potential problems with parasites and pathogens.

1.134 Determine public relations aspects of reestablishment.

Consider landowner support, State game and/or regulatory agency support, potential for depredation problems from expanding wolf population, public attitudes associated with wolves, etc.

1.135 Determine compatability of species to ecosystem.

Evaluate capability of the site to support wolves with adequate prey, cover, expansion potential.

Determine impact of red wolves on existing ecosystem.

1.2 Re-evaluate reestablishment sites.

Based on the information derived from the initial releases, reexamine the list of potential sites and, if necessary or appropriate, institute a new search for additional or substitute areas based on modified criteria.

(At the present time, using existing criteria of public ownership, relative isolation, large site requirement, low Canis presence, willingness to participate, etc., only two sites have been identified. A major factor in developing these criteria was public attitude. If the reestablishment efforts at these two sites can be accomplished without adverse reaction, or, hopefully enthusiastic public support, it would tend to eliminate the requirements of public ownership and/or relative isolation. If a viable self-sustaining population can be established without hybridization problems, it would lead to the reconsideration of other sites of public ownership and suitable size presently rejected because of Canis numbers. If the home range of the released animals is considerably less than anticipated - based on the southwest Louisiana-southeast Texas habitat - it would permit the consideration of sites presently rejected because of size. Any combination of these factors could provide the potential for consideration of a number of additional release sites.)

expressed an interest in obtaining red wolves. Presumably, additional zoos would enter into the program when red wolf stock became available but their combined capacity would still probably be less than the 50 pair objective. The need for this number of animals is subject to revision pending results of other facets of the recovery action, and, with successful reestablishment in the wild, could be reduced considerably and the use of government supported facilities phased out.

The actions outlined in the plan, of necessity, have to be generalized in nature. Prior to any actual reestablishment activity it is recognized that a much more specific document outlining procedures tailored to conditions of the particular site will have to be prepared. This document will have to address such variables as public relations, canid control techniques, monitoring, conditioning or "training" of animals prior to release, agency responsibilities, number of animals, location of release, time (season) of release, etc. This document is identified in the step-down outline as the reestablishment proposal, and presumably will have to receive the concurrence of all parties involved.

Agencies presently recognized as serving in the recovery of the species include, but may not be limited to, the U.S. Fish and Wildlife Service (USFWS), the Point Defiance Zoological Gardens of the Metropolitan Park District of Tacoma, Washington (PDZG), the American Association of Zoological Parks and Aquariums (AAZPA), zoological parks and environmental groups across the nation, government landholding agencies in the Southeast United States, and State game departments and/or regulatory agencies in States where reestablishment sites are selected.

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PART III.

IMPLEMENTATION SCHEDULE

Priorities within this section (Column 4) have been assigned according to the following:

Priority 1 - Those actions absolutely necessary to prevent extinction of the species.

Priority 2 - Those actions necessary to maintain the species' current population status.

Priority 3 - All other actions necessary to provide for full recovery of the species.

IMPLEMENTATION SCHEDULE

Red Wolf

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency FWS Region	Responsible Agency FWS Program	Responsible Agency Other	Estimated Fiscal Year Costs FY 85	FY 86	FY 87	Comments/Notes
M 2	Prepare reestablishment proposals.	1.11	1	Continuing	4,2		State, Fed. Agencies	6,000	6,000		Land Between the Lakes (LBL) proposal under review.
I 13	Establish requirements for release site.	1.12	1	Continuing	4,2						Initial requirements established.
I 13	Evaluate and select release sites.	1.13	1	Completed	4,2						Initial evaluation completed.
I 13	Estimate Canis composition.	1.131	1	Continuing			State, Fed. Agencies				Completed for LBL.
I 13	Determine feasibility of Canis removal.	1.132	1	Continuing			State, Fed. Agencies				Completed for LBL.
I 13	Evaluate parasite/disease problems.	1.133	1	Continuing	4						Completed for LBL.
O 1	Evaluate public relations aspect of reestablishment.	1.134	1	Continuing	4,2		State, Fed. Agencies				
I 13	Determine compatiblity of species to ecosystem.	1.135	1	Continuing	4,2		State, Fed. Agencies				
M 2	2 => Reintroduction of species										
M 1	Maintain captive breeding program.	2.5	1	Ongoing	2		PDZ*	30,000	30,000	30,000	
M 1	Maintain broodstock integrity.	2.2	1	Continuing	2		AAZPA**				Costs are included task 2.5.
M 1	Breeding pair selection; certification of offspring.	2.3	1	Continuing	2						Costs are included task 2.5.
M 1	Breeding records; disposition of excess wolves.	2.4	1	Continuing	2		AAZPA	1,000	1,000	1,000	

* Point Defiance Zoo
** American Association of Zoological Parks and Aquariums

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES *

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

* (Column 1) - Primarily for use by the U.S. Fish and Wildlife Service.

IV. APPENDIX

Recovery Team Responses to Selected Comments from Reviewers

Several reviewers recommended that studies and monitoring be continued within the southeastern Texas - southwestern Louisiana range, either on a continuous or periodic basis. It was pointed out that this area still contains a number of animals that are at least 50% red wolf and that such studies could be invaluable in documenting the influence of coyote infusion or that the animals themselves might be used in efforts to breed back the species. There was concern that the techniques used at present to certify the breeding stock could be eliminating some of the gene characteristics of the red wolf.

The recent (January 1981) killing of a wild canid by a hunter in St. Martin Parish, Louisiana, brings out their point. The hunter skinned the animal on the spot and left the carcass. He attempted to sell the skin to a fur dealer, who tentatively identified it as being from a red wolf. The skull was retrieved and examined and its measurements fell within the range of Canis rufus, raising the possibility of a remnant population in the Atchafalaya Basin. It should be recognized, however, that the recovery of a single skull that falls within these parameters does not necessarily indicate the presence of a remnant population.

One reviewer suggested we should consider the use of embryo transplants as a possibility. The technique would utilize captive wild-caught coyotes as surrogate mothers, surgically fixed to prevent later pregnancy. The methodology has been utilized by the cattle industry to upgrade livestock; but there was no indication of its use in canids.

The purpose of using embryo transplants was to provide a "wild" mother to educate her "offspring", as opposed to an actual parent that had become accustomed to captivity. Other reviewers expressed similar concerns about the ability of captive animals to adapt to the wild, and suggested the need for behaviorial studies and training prior to release.

We recognize that there may be remnant red wolf populations remaining in the wild and that if so it would be extremely valuable to know about them, but we also feel that there has to be a point of diminishing returns for the potential of locating them and that this point has probably already been reached. This would not preclude subsequent investigations into locations where there might be tangible reasons to make intensive searches, as possible in the case of the recent Louisiana incident, but only in such cases.

Without infinite resources the captive breeding program has to concentrate its efforts on the animals most closely resembling the parameters established for the species. The use of breeding stock with only 50% red wolf genes could only be accomplished at the cost of eliminating some of those animals presently in the captive breeding program. Considerable time, money, and effort has been expended to eliminate those individuals that do not breed up to the established parameters and to include additional recognized hybrids would be a step backwards.

The team feels that the red wolf is an opportunistic predator and that it should have no difficulties in adapting to living in the wild following an adequately designed and carried out "training" program. This appeared to be the case with the pair released on Bulls Island and we have no reason to suspect that it should be any different at any other release site with an adequate prey base.

Acknowledgement

On behalf of the Red Wolf Recovery Team I would like to take this opportunity to express the Team's appreciation to Curtis Carley for his assistance in the preparation of the Recovery Plan.

Much of the material contained in the Introduction section of the plan was plagiarized from a publication authored by Mr. Carley and titled Status Summary: The Red Wolf (Canis refus), U.S. Fish and Wildlife Service Endangered Species Report 7.

David W. Peterson
Team Leader