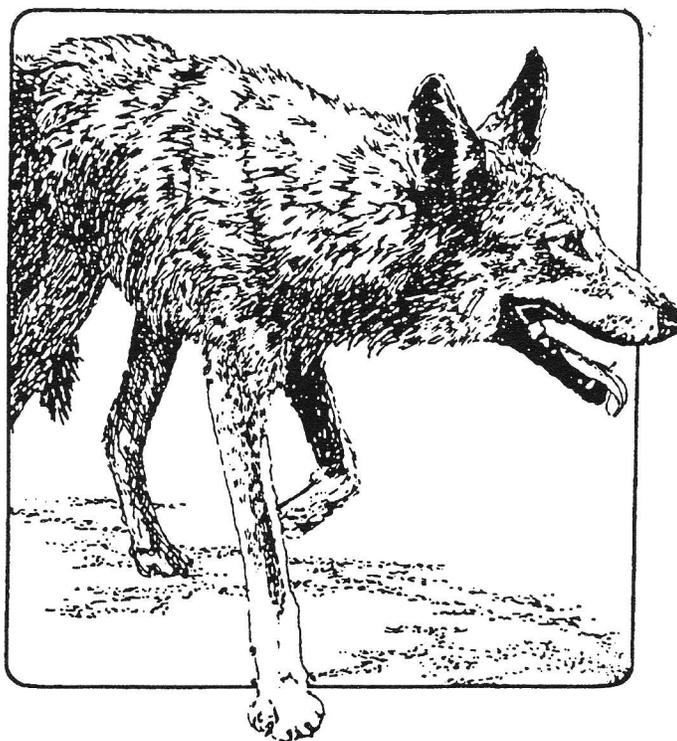


Red Wolf Management Series  
Technical Report No. 10

Reestablishment of Red Wolves in  
the Alligator River National Wildlife Refuge,  
North Carolina

September 14, 1987 through September 30, 1992



U.S. Fish and Wildlife Service  
Southeast Region

RED WOLF MANAGEMENT SERIES  
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REESTABLISHMENT OF RED WOLVES IN THE  
ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE,  
NORTH CAROLINA

SEPTEMBER 14, 1987 THROUGH SEPTEMBER 30, 1992

by

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## INTRODUCTION

The purpose of this report is to summarize the 5-year U.S. Fish and Wildlife Service (Service) experiment to reestablish a population of red wolves (*Canis rufus*) in the Alligator River National Wildlife Refuge (ARNWR) in northeastern North Carolina.

## RELEASES

From September 14, 1987, through September 30, 1992, a total of 42 wolves (adults: 10 males and 9 females; yearlings: 1 female; and pups: 12 males and 10 females) were released on 15 occasions (Tables 1 and 2). Four releases were conducted in 1987, two in 1988, five in 1989, two in 1990, one in 1991, and one in 1992 (Table 2). As of September 30, 1992, there were 30 free-ranging wolves in northeastern North Carolina (Table 3).

Animals were initially released as members of seven adult pairs, an adult and a yearling, an adult and a pup, five families, and one sibling pair (Table 2). Adults are defined as animals more than 24 months of age; yearlings, between 12 and 24 months of age; and pups, less than 12 months of age. Released adults ranged in age from 2.25 years to 7.33 years (Table 1).

## OUTCOME OF RELEASES

Wide-ranging movements, which created management situations or led to the death of an animal soon after release, were common (Tables 4 and 5). Of 31 releases of adults and 22 releases of pups, 18 and 10, respectively, required the return of an animal to captivity or led to the animal's death within 2 months. Length of acclimation, release area, location of resident wolves, and type of social group released all affected the probability of a wolf successfully establishing itself in the wild.

Of the 42 wolves released, 22 died (Table 6), 7 were returned to captivity for management reasons (Table 7), 11 were free-ranging through September 30, 1992 (Table 8), and the fates of 2 are unknown. Length of time in the wild varied from 16 days (wolf number 399F) to 3.5 years (wolf number 300F) (Table 1).

Reintroduced wolves were killed by one of at least seven mortality factors (Table 6). Vehicles (n = 8), intraspecific aggression (n = 5), and drownings (n = 4) were the most significant sources of mortality. It is a measure of the program's success that all but two of the deaths were natural or accidental, not the result of a citizen acting irresponsibly.

## PRODUCTION IN THE WILD

A minimum of 22 wolves were born in the wild (Table 9). These animals were members of eight litters produced by 11 adults (6 males and 5 females). Two litters were produced in 1988, at least one in 1990, four in 1991, and at least one in 1992. No pups were born in the wild during 1989 because there were no adult pairs together during the breeding season.

Only two wild-born wolves died (Table 10), and the fate of one is unknown. As of September 30, 1992, wild-born wolves accounted for 63 percent of the population (19 of 30) (Table 3).

Of the 11 adults that bred in the wild, 1 was wild-born and 10 were captive-born. Wild-born offspring offer compelling evidence that captive-born-and-reared adults can make the transition from captivity to life in the wild.

## **DISPERSAL**

As expected, wild-born pups exhibited wide-ranging movements as they dispersed from natal home ranges (Table 11). These animals, with the exception of wolf number 498F, traveled up to 192 kilometers before establishing new home ranges on private land south or west of Alligator River. Wolf number 498F was killed by a vehicle before she established a new home range. Dispersal age ranged between 7 and 22 months. The youngest wolves to disperse were siblings (wolf numbers 496F, 497M, and 498F) that left their natal home range after their parents were returned to captivity. Likewise, wolf number 505F dispersed at a young age after her mother was returned to captivity. It is likely that some or all of these pups would not have dispersed had their families remained intact.

## **MANAGEMENT**

Of the released wolves, 24 were recaptured 63 times; 17 of the wild-born wolves were recaptured 39 times. Most recaptures were necessary in order to meet program objectives (replace radio-collars, place a specific wolf with a mate, translocate an animal to a suitable site, etc.). Every management problem has been resolved without inflicting significant long-term damage to the animals and with little or no inconvenience to residents living in the area.

## **CAPTIVE BREEDING**

Captive breeding has been an integral component of the reintroduction program. Since 1986, a total of 79 wolves have been held in captivity at the ARNWR for varying periods of time. As of September 30, 1992, a total of 10 wolves were in captivity. During the 5-year experiment, 20 captive adult pairs have produced 34 pups. With access to 12 acclimation pens, ARNWR will continue to be an important component of the red wolf captive-breeding program.

## **SUMMARY**

The year 1992 marked the fifth year of the 5-year experiment to reintroduce red wolves in ARNWR. By almost every measure the reintroduction experiment has been successful and has generated benefits that extend beyond the immediate preservation of red wolves. The effort has had a positive effect on local citizens and communities and has aided larger conservation efforts as well as other imperiled species. Because of this success a plan is being developed to expand the objectives of this reintroduction program. During the last 5 years, three important points surfaced:

1. Since every management problem has been resolved without inflicting long-term damage to animals and with little inconvenience to the residents

living in the area, we know that wolves can be restored in a controlled manner.

2. Significant land-use restrictions were not necessary in order for wolves to survive. Indeed, hunting and trapping regulations for ARNWR remained unchanged or were further relaxed during the experiment. Additionally, no restrictions were needed in order for the wolves to survive on private land.
3. The reintroduction area, which encompasses about 250,000 acres, probably cannot support 30 wolves for an extended period of time. Indeed, dispersal outside the reintroduction area by wild-born wolves has occurred and will continue. In addition to dispersal, the future of the wolf population is threatened by its smallness; many events (e.g., disease outbreaks) can cause the extinction of small populations.

Increasing the size of the wolf population minimizes the threats to its survival. The primary factor limiting population size is the size of the reintroduction area. A larger reintroduction area would provide habitat for dispersing wolves and would provide opportunities for the Service to release additional wolves. Fortunately, the reintroduction area can easily be enlarged by adding the Pocosin Lakes National Wildlife Refuge to the project. This refuge would be ideal for probably 15 to 25 wolves because of its large size, remoteness, abundant prey populations, and proximity to ARNWR. Inclusion of the Pocosin Lakes National Wildlife Refuge into the red wolf program is supported by local Service refuge managers (see four attached memos).

## **ACKNOWLEDGMENTS**

Many people and organizations contributed to the success of the red wolf project. Biologists Michael Morse, Art Beyer, Jennifer Dagen, and Jonathan Windley contributed mightily. Warren Parker, and later Gary Henry, acted as species coordinator; John Taylor, and later Jim Johnson, acted as refuge manager of ARNWR. All provided guidance and support. Bonnie Strawser helped with educational programs, volunteers, fund-raising, and procurement. Beverly Midgett and Janice Lane provided secretarial and moral support. Other staff members at ARNWR also contributed. Roland Smith, Sue Behrns, and Will Waddell from the Point Defiance Zoo and Aquarium provided technical and moral support. Recovery team members Roland Smith, Don Wood, and Drs. David Mech, Ulysses S. Seal, Michael Pelton, and Victor Nettles provided technical and moral support. Steve Jackson, Janet Walker, the North Banks Rotary Club, the Wake County Wildlife Club, the Coastal Wildlife Refuge Society, and the National Fish and Wildlife Foundation assisted with fund-raising.

TABLE 1 - Captive-born red wolves released in the ARNWR from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Release Age (Months)	Period in the Wild	Number of Months in the Wild	Comments
140M	88.4	09/14/87 - 10/20/87	1.2	Captured; frequenting a community. Captured; frequenting a community. Captured; left reintroduction area. Died; collision with a vehicle.
		10/30/87 - 11/19/87	0.7	
		12/02/87 - 01/31/88	2.0	
		04/12/88 - 06/15/88	<u>2.1</u>	
		Total Number of Months in the Wild -	6.0	
184M	76.8	10/01/87 - 10/30/87	1.0	Captured; replace radio-collar. Died; collision with a vehicle.
		11/07/87 - 05/29/88	<u>6.7</u>	
		Total Number of Months in the Wild -	7.7	
194F	76.8	10/01/87 - 10/21/87	0.7	Captured; left reintroduction area. Captured; left reintroduction area; not rereleased.
		10/29/87 - 12/11/87	<u>1.4</u>	
		Total Number of Months in the Wild -	2.1	
196F	76.8	10/01/87 - 01/08/88	3.3	Captured; replace radio-collar. Died; uterine infection.
		01/11/88 - 06/25/88	<u>5.5</u>	
		Total Number of Months in the Wild -	8.8	
205F	65.1	10/01/87 - 12/22/87	2.7	Captured; replace radio-collar. Captured; breeding purposes. Captured; replace radio-collar. Captured; replace radio-collar. Captured; breeding purposes.
		01/11/88 - 01/05/89	11.8	
		08/01/89 - 11/14/90	15.4	
		11/30/90 - 09/02/91	9.1	
		09/03/91 - 11/03/91	<u>2.0</u>	
		Total Number of Months in the Wild -	41.0	
208M	85.8	07/03/89 - 07/31/89	<u>0.9</u>	Died; collision with a vehicle.
		Total Number of Months in the Wild -	0.9	

Table 1 (continued)

Wolf No. and Sex	Release Age (Months)	Period in the Wild	Number of Months in the Wild	Comments
211M	64.9	10/01/87 - 01/09/88	3.3	Captured; replace radio-collar. Captured; replace radio-collar. Suffocated.
		01/11/88 - 10/25/88	9.5	
		10/28/88 - 12/27/88	<u>2.0</u>	
		<b>Total Number of Months in the Wild -</b>	<b>14.8</b>	
227M	53.1	10/01/87 - 11/08/87	1.3	Captured; replace radio-collar. Captured; frequenting a community. Died; intraspecific aggression.
		04/14/88 - 05/16/88	1.1	
		08/01/89 - 09/05/89	<u>1.2</u>	
		<b>Total Number of Months in the Wild -</b>	<b>3.6</b>	
231F	52.1	09/14/87 - 11/20/87	2.2	Captured; translocation. Died; pleural effusion and internal bleeding.
		12/02/87 - 12/18/87	<u>0.5</u>	
		<b>Total Number of Months in the Wild -</b>	<b>2.7</b>	
300F	23.1	04/12/88 - 01/08/89	8.9	Captured; breeding purposes. Captured; replace radio-collar. Captured; management reasons. Free-ranging.
		07/03/89 - 01/24/91	18.7	
		02/07/91 - 01/17/92	11.4	
		01/31/92 - 09/30/92	<u>8.0</u>	
		<b>Total Number of Months in the Wild -</b>	<b>47.0</b>	
304F	52.3	09/17/90 - 09/25/90	0.3	Accidental capture. Captured; breeding purposes.
		10/04/90 - 11/19/90	<u>1.5</u>	
		<b>Total Number of Months in the Wild -</b>	<b>1.8</b>	
313F	27.8	08/22/89 - 10/18/89	1.9	Captured; left reintroduction area. Captured; frequenting a community. Captured; frequenting a community.
		10/03/90 - 06/29/91	8.8	
		07/01/91 - 09/18/91	<u>2.6</u>	
		<b>Total Number of Months in the Wild -</b>	<b>13.3</b>	

Table 1 (continued)

Wolf No. and Sex	Release Age (Months)	Period in the Wild	Number of Months in the Wild	Comments
316F	28.3	09/04/89 - 12/27/89 Total Number of Months in the Wild -	<u>3.8</u> 3.8	Fate unknown; radio-collar malfunctioned.
319M	28.3	09/04/89 - 01/26/91 02/07/91 - 01/17/92 01/31/92 - 09/30/92 Total Number of Months in the Wild -	4.8 11.3 <u>8.0</u> 24.1	Captured; replace radio-collar. Captured; replace radio-collar. Free-ranging.
322F	11.0	04/14/88 - 06/06/88 Total Number of Months in the Wild -	<u>1.8</u> 1.8	Captured; frequenting a community.
327M	40.1	09/17/90 - 10/04/90 Total Number of Months in the Wild -	<u>0.6</u> 0.6	Drowned.
328M	27.2	08/22/89 - 10/12/89 10/03/90 - 07/01/91 Total Number of Months in the Wild -	1.7 <u>8.9</u> 10.6	Captured; left reintroduction area. Captured; injured by a vehicle.
331M	9.1	01/25/89 - 09/30/92 Total Number of Months in the Wild -	<u>44.2</u> 44.2	Free-ranging.
332M	9.1	01/25/89 - 11/21/89 Total Number of Months in the Wild -	<u>9.9</u> 9.9	Died; collision with a vehicle.
337F	39.2	08/13/91 - 10/26/91 Total Number of Months in the Wild -	<u>2.5</u> 2.5	Captured; breeding purposes.
352M	27.9	08/13/91 - 09/15/91 Total Number of Months in the Wild -	<u>1.1</u> 1.1	Died; collision with a vehicle.
372M	38.9	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.

Table 1 (continued)

Wolf No. and Sex	Release Age (Months)	Period in the Wild	Number of Months in the Wild	Comments
382F	38.6	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.
392M	3.1	08/01/89 - 03/26/91 04/04/91 - 09/30/92 Total Number of Months in the Wild -	19.8 <u>17.9</u> 37.7	Captured; replace radio-collar. Free-ranging.
393F	3.1	08/01/89 - 01/24/90 Total Number of Months in the Wild -	<u>5.8</u> 5.8	Died; collision with a vehicle.
394F	3.1	08/01/89 - 11/30/90 12/04/90 - 09/30/92 Total Number of Months in the Wild -	15.9 <u>22.1</u> 38.0	Captured; replace radio-collar. Free-ranging.
395F	3.1	08/01/89 - 01/11/90 Total Number of Months in the Wild -	<u>5.4</u> 5.4	Drowned after having been captured in a leg-hold trap.
397M	5.5	09/17/90 - 09/25/90 10/04/90 - 10/12/90 Total Number of Months in the Wild -	0.3 <u>0.3</u> 0.6	Accidental capture. Drowned.
398F	5.5	09/17/90 - 09/23/90 10/04/90 - 10/15/90 Total Number of Months in the Wild -	0.2 <u>0.4</u> 0.6	Accidental capture. Drowned.
399F	5.5	09/17/90 - 09/23/90 10/04/90 - 10/12/90 Total Number of Months in the Wild -	0.2 <u>0.3</u> 0.5	Accidental capture. Fate unknown; last recorded location.
426M	5.1	10/03/90 - 07/15/91 Total Number of Months in the Wild -	<u>9.4</u> 9.4	Died; collision with a vehicle.
427M	5.1	10/03/90 - 10/20/90 Total Number of Months in the Wild -	<u>0.6</u> 0.6	Shot.

Table 1 (continued)

Wolf No. and Sex	Release Age (Months)	Period in the Wild	Number of Months in the Wild	Comments
430F	5.1	10/03/90 - 05/18/92 Total Number of Months in the Wild -	<u>19.5</u> 19.5	Died; cause unknown.
459M	3.6	08/13/91 - 09/09/91 Total Number of Months in the Wild -	<u>0.9</u> 0.9	Died; intraspecific aggression.
460M	3.6	08/13/91 - 09/09/91 Total Number of Months in the Wild -	<u>0.9</u> 0.9	Died; intraspecific aggression.
461M	3.6	08/13/91 - 09/10/91 Total Number of Months in the Wild -	<u>0.9</u> 0.9	Died; intraspecific aggression.
462F	3.6	08/13/91 - 09/09/91 Total Number of Months in the Wild -	<u>0.9</u> 0.9	Died; intraspecific aggression.
466F	3.6	08/13/91 - 09/12/91 Total Number of Months in the Wild -	<u>1.0</u> 1.0	Died; collision with a vehicle.
517M	3.5	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.
518M	3.5	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.
519M	3.5	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.
523F	3.5	08/03/92 - 09/30/92 Total Number of Months in the Wild -	<u>1.9</u> 1.9	Free-ranging.

TABLE 2 - Social groups of captive-born red wolves released in the ARNWR from September 14, 1987, through September 30, 1992.

Year/Wolf Numbers	Social Group	Date of Initial Release
<u>1987:</u> 140M and 231F 184M and 205F 211M and 196F 227M and 194F	Adult pair Adult pair Adult pair Adult pair	09/14/87 10/01/87 10/01/87 10/01/87
<u>1988:</u> 140M and 300F 227M and 322F	Adult and yearling Adult and pup	04/12/88 04/14/88
<u>1989:</u> 331M and 332M 208M and 300F 227M and 205F and pups (392M, 393F, 394F, and 395F) 328M and 313F 319M and 316F	Sibling pair Adult pair Family  Adult pair Adult pair	01/25/89 07/03/89 08/01/89  08/22/89 09/04/89
<u>1990:</u> 327M and 304F and pups (397M, 398F, and 399F) 328M and 313F and pups (426M, 427M, and 430F)	Family  Family	09/17/90  10/03/90
<u>1991:</u> 352M and 337F and pups (459M, 460M, 461M, 462F, and 466F)	Family	08/13/91
<u>1992:</u> 372M and 382F and pups (517M, 518M, 519M, and 523F)	Family	08/03/92

TABLE 3 - Free-ranging red wolves in eastern North Carolina as of September 30, 1992.

Wolf No. and Sex	Birth Location	Age (Months) <sup>a</sup>	No. of Months in the Wild <sup>b</sup>	Location of Home Range	Comments
300F	Captivity	77.5	47.0	ARNWR	Breeding female
319M	Captivity	65.0	24.1	ARNWR	Breeding male
331M	Captivity	53.2	44.2	Private land	Breeding male
344F	Wild	53.7	53.7 <sup>c</sup>	Private land	Breeding female
372M	Captivity	40.8	1.9	Private land	Released 08/03/92
382F	Captivity	40.4	1.9	Private land	Released 08/03/92
392M	Captivity	41.1	37.7	Private land	Breeding male
394F	Captivity	41.1	38.0	ARNWR	Pack member
442M	Wild	28.7	28.7	Private land	Lone wolf
443F	Wild	28.7	28.0 <sup>d</sup>	Private land	Lone wolf
444F	Wild	28.7	28.7	Private land	Pack member
496F	Wild	17.5	17.5	Private land	Lone wolf
497M	Wild	17.5	17.5	Private land	Lone wolf
500F	Wild	17.0	17.0	Private land	Pack member
501F	Wild	17.0	17.0	Private land	Pack member
502F	Wild	17.0	17.0	Private land	Pack member
503F	Wild	17.0	17.0	Private land	Lone wolf
504M	Wild	17.0	17.0	Private land	Pack member
505F	Wild	17.1	17.1	Private land	Lone wolf
506M	Wild	17.1	17.1	ARNWR	Pack member
507M	Wild	17.1	17.1	ARNWR	Pack member
508M	Wild	17.1	17.1	ARNWR	Pack member
509?	Wild	17.1	17.1	ARNWR	Pack member
517M	Captivity	5.5	1.9	Private land	Pack member
518M	Captivity	5.5	1.9	Private land	Pack member
519M	Captivity	5.5	1.9	Private land	Pack member

Table 3 (continued)

Wolf No. and Sex	Birth Location	Age (Months) <sup>a</sup>	No. of Months in the Wild <sup>b</sup>	Location of Home Range	Comments
523F	Captivity	5.5	1.9	Private land	Pack member
580?	Wild	4.9	4.9 <sup>e</sup>	ARNWR	Pack member
581?	Wild	4.9	4.9 <sup>e</sup>	ARNWR	Pack member
582?	Wild	4.9	4.9 <sup>e</sup>	ARNWR	Pack member

<sup>a</sup> - Age is calculated relative to September 30, 1992.

<sup>b</sup> - Number of months in the wild does not necessarily span the period from the date of release through September 30, 1992, as some captive-born wolves were returned to captivity for varying periods of time and were subsequently rereleased.

<sup>c</sup> - The radio-collar on wolf number 344F malfunctioned sometime between September 8 and 11, 1992. She is presumed to have survived through September 30, 1992.

<sup>d</sup> - Wolf number 443F spent time in captivity for the purpose of administering medication and implanting an abdominal transmitter.

<sup>e</sup> - Wolf numbers 580?, 581?, and 582? were observed on September 7, 1992; they are presumed to be alive.

TABLE 4 - Information about the movements of captive-born red wolves released as yearlings (wolf number 300F was the only yearling) or adults in the the ARNWR from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Length of Acclimation (Months)	Date of Release - Movements <sup>a</sup>	Time in Release Area (Months) <sup>b</sup>	Distance/Direction Traveled	Comments <sup>c</sup>
140M	10.5	09/14/87 - 10/16/87 10/30/87 - 11/12/87 12/02/87 - 01/19/88	1.0 0.5 1.6	12 km E 12 km E 80 km N, W, and S	Returned to captivity. Returned to captivity. Returned to captivity.
	12.8 <sup>d</sup>	04/12/88 - 05/19/88	1.2	60 km S, E, and N	Died 06/15/88.
184M	10.5	10/01/87 - -----	7.7	-----	Died 05/29/88.
194F	10.5	10/01/87 - 10/19/87	0.6	22 km S	Returned to captivity.
		10/29/87 - 11/06/87	0.3	32 km S	Returned to captivity.
196F	10.5	10/01/87 - -----	8.8	-----	Died 06/25/88.
205F	10.5	10/01/87 - -----	14.5	-----	Returned to captivity 01/05/89.
	17.3	08/01/89 - -----	26.5	-----	Returned to captivity 11/03/91.
208M	5.7	07/03/89 - 07/29/89	0.8	15 km SE	Died 07/31/89.
211M	10.5	10/01/87 - -----	14.8	-----	Died 12/27/88.
227M	10.5	10/01/87 - -----	1.3	-----	Returned to captivity.
	15.6	04/14/88 - 05/05/88	0.7	12 km E	Returned to captivity.
	30.1	08/01/89 - -----	1.2	-----	Died 09/05/89.
231F	10.5	09/14/87 - -----	2.2	-----	Moved with mate.
		12/02/87 - -----	0.5	-----	Died 12/18/87.
300F	2.6	04/12/88 - -----	8.9	-----	Returned to captivity.
	8.4	07/03/89 - -----	38.1	-----	

Table 4 (continued)

Wolf No. and Sex	Length of Acclimation (Months)	Date of Release - Movements <sup>a</sup>	Time in Release Area (Months) <sup>b</sup>	Distance/Direction Traveled	Comments <sup>c</sup>
304F	2.2	09/17/90 - 10/12/90	0.8	32 km S	Returned to captivity.
313F	18.9 30.4	08/22/89 - 09/24/89 10/03/90 - -----	1.1 11.4	35 km S -----	Returned to captivity. Returned to captivity.
316F <sup>e</sup>	19.4	09/04/89 - -----	3.8	-----	Fate unknown.
319M	19.4	09/04/89 - -----	24.1	-----	
327M	2.2	09/17/90 - 09/21/90	0.2	?????????? <sup>f</sup>	Drown 10/04/90.
328M	18.9 30.4	08/22/90 - 10/08/90 10/03/90 - -----	1.5 8.9	35 km S -----	Returned to captivity. Returned to captivity.
337F <sup>g</sup>	27.3	08/13/91 - 09/19/91	1.2	17 km NW	Returned to captivity.
352M	8.2	08/13/91 - 09/12/91	1.0	17 km NW	Died 09/15/90.
372M	16.6	08/03/92 - -----	1.9	-----	
382F	27.5	08/03/92 - -----	1.9	-----	
<p><sup>a</sup> - No date is listed for wolves that did not exhibit wide-ranging movements which created management situations or led to the death of an animal.</p> <p><sup>b</sup> - For wolves that did not disperse, time spent in the release area is calculated through the date of death or September 30, 1992.</p> <p><sup>c</sup> - No comment is provided for wolves that restricted their movements to the release area and survived through September 30, 1992.</p> <p><sup>d</sup> - For wolves that experienced two or more acclimation periods, the value given represents the total acclimation time.</p>					

Table 4 (continued)

Wolf No. and Sex	Length of Acclimation (Months)	Date of Release - Movements <sup>a</sup>	Time in Release Area (Months) <sup>b</sup>	Distance/Direction Traveled	Comments <sup>c</sup>
<p><sup>e</sup> - The movements of wolf number 316F are not well understood because her radio-collar malfunctioned 3.8 months after release. However, her movements were restricted to the release area prior to the malfunction of the collar.</p> <p><sup>f</sup> - Question marks are shown for 327M because the direction or distance he traveled as he left Durant Island is not known. He drowned as he tried to cross Albemarle Sound; his carcass was found floating in water 9 kilometers west/southwest of the release site.</p> <p><sup>g</sup> - Wolf number 337F was born in captivity at ARNWR.</p>					

TABLE 5 - Information about the movements of red wolf pups released in the ARNWR from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Length of Acclimation (Months) <sup>a</sup>	Date of Release - Movements <sup>b</sup>	Age at Recapture (Months)	Time in Release Area (Months) <sup>c</sup>	Distance/Direction Traveled	Comments
322F <sup>d</sup>	2.6	04/14/88 - 04/22/88	11.3	0.3	20 km SW	Began frequenting a community; returned to captivity 06/06/88.
331M <sup>d</sup>	0.2	01/25/89 - -----	----	44.2	-----	Became breeding male; survived through 09/30/92.
332M <sup>d</sup>	0.2	01/25/89 - -----	----	9.9	-----	Died 11/21/89.
392M	---	08/01/89 - -----	----	37.7	30 km SW	Became breeding male; survived in dispersal area through 09/30/92.
393F	---	08/01/89 - -----	----	5.8	-----	Died 01/24/90.
394F	---	08/01/89 - -----	----	38.0	-----	Became breeding female; survived through 09/30/92 in release area.
395F	---	08/01/89 - -----	----	5.4	-----	Drown 01/11/90.
397M <sup>e</sup>	---	10/04/90 - 10/12/90	7.1	0.3	-----	Drown 10/12/90.
398F <sup>e</sup>	---	10/04/90 - 10/15/90	7.2	0.4	-----	Drown 10/15/90.

Table 5 (continued)

Wolf No. and Sex	Length of Acclimation (Months) <sup>a</sup>	Date of Release - Movements <sup>b</sup>	Age at Recapture (Months)	Time in Release Area (Months) <sup>c</sup>	Distance/Direction Traveled	Comments
399F <sup>e</sup>	---	10/04/90 - 10/12/90	----	0.3	-----	Disappeared 10/12/90; fate unknown, presumed dead.
426M	---	10/03/90 - -----	----	9.4	-----	Died 07/15/91.
427M	---	10/03/90 - 10/10/90	5.3	0.2	34 km SW	Died 10/20/90.
430F	---	10/03/90 - -----	----	23.9	-----	Died 05/18/92.
459M	---	08/13/91 - 09/03/91	5.3	0.7	-----	Died 09/09/91.
460M	---	08/13/91 - 09/03/91	5.3	0.7	-----	Died 09/09/91.
461M	---	08/13/91 - 08/30/91	5.1	0.5	-----	Died 09/10/91.
462F	---	08/13/91 - 09/03/91	5.3	0.7	-----	Died 09/09/91.
466F	0.7	08/13/91 - 09/10/91	4.5	0.9	-----	Died 09/12/91.
517M	---	08/03/92 - -----	----	1.9	-----	Inhabited release area; survived through 09/30/92.
518M	---	08/03/92 - -----	----	1.9	-----	Inhabited release area; survived through 09/30/92.
519M	---	08/03/92 - -----	----	1.9	-----	Inhabited release area; survived through 09/30/92.

Table 5 (continued)

Wolf No. and Sex	Length of Acclimation (Months) <sup>a</sup>	Date of Release - Movements <sup>b</sup>	Age at Recapture (Months)	Time in Release Area (Months) <sup>c</sup>	Distance/Direction Traveled	Comments
523F	---	08/03/92 - -----	----	1.9	-----	Inhabited release area; survived through 09/30/92.
<p><sup>a</sup> - Length of acclimation is not determined for wolves born in captivity at the ARNWR.</p> <p><sup>b</sup> - No date is listed for wolves that did not exhibit wide-ranging movements which created management situations or led to the death of an animal.</p> <p><sup>c</sup> - For wolves that did not disperse, time spent in the release area is calculated through the date of death or September 30, 1992.</p> <p><sup>d</sup> - Wolf numbers 332F and siblings 331M and 332M were not released with the parents. Rather, wolf number 322F was released with an adult male, and wolf numbers 331M and 332M were released together.</p> <p><sup>e</sup> - Although wolves 397M, 398F, and 399F were originally released on September 17, 1990, their release date for this table is listed as October 4, 1990 because they had been returned to captivity for a short period of time following their original release.</p>						

TABLE 6 - Mortality of captive-born red wolves released in the ARNWR from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Year/Date of Death	Age at Death (Months)	Period in the Wild (Months)	Cause of Death
231F	<u>1987:</u> 12/18/87	55.2	2.7	Pleural effusion and internal bleeding.
184M 140M 196F 211M	<u>1988:</u> 05/29/88 06/15/88 06/25/88 12/27/88	84.7 97.4 85.6 79.8	7.7 6.0 8.8 14.8	Vehicle. Vehicle. Uterine infection. Suffocated.
208M 227M 332M	<u>1989:</u> 07/31/89 09/05/89 11/21/89	86.8 76.2 19.0	0.9 3.6 9.9	Vehicle. Intraspecific aggression. Vehicle.
395F 393F 327M 397M 398F 427M	<u>1990:</u> 01/11/90 01/24/90 10/04/90 10/12/90 10/15/90 10/20/90	8.2 8.6 40.6 6.1 6.1 5.6	5.4 5.8 0.6 0.6 0.6 0.6	Drowned. Vehicle. Drowned. Drowned. Drowned. Shot.
426M 459M 460M 461M 462F 466F 352M	<u>1991:</u> 07/15/91 09/09/91 09/09/91 09/10/91 09/09/91 09/12/91 09/15/91	14.4 4.5 4.5 4.5 4.5 4.5 28.9	9.4 0.9 0.9 0.9 0.9 1.0 1.1	Vehicle. Intraspecific aggression. Intraspecific aggression. Intraspecific aggression. Intraspecific aggression. Vehicle. Vehicle.
430F	<u>1992:</u> 05/18/92	24.5	23.9	Unknown, necropsy report pending.

TABLE 7 - Captive-born red wolves that were released in the ARNWR but were returned to captivity during the period September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Date of Return	Age at Return (Months)	No. of Months in the Wild	Cause of Return
194F	12/11/87	79.2	2.1	Left reintroduction area
205F	11/03/91	114.1	41.0	For breeding
304F	11/19/90	53.7	1.8	For breeding
313F	09/18/91	51.6	13.3	Frequenting a community
322F	06/06/88	12.8	1.8	Frequenting a community
328M	07/01/91	49.5	10.6	Injured by a vehicle
337F	10/26/91	41.6	2.5	For breeding

TABLE 8 - Captive-born red wolves that were released in the ARNWR and were free-ranging as of September 30, 1992.

Wolf No. and Sex	Date of Initial Release	Age at Release (Months)	No. of Months in the Wild <sup>a</sup>	Location of Home Range
300F	04/12/88	22.8	47.0	Western portion of ARNWR
319M	09/04/89	27.6	24.1	Western portion of ARNWR
331M	01/25/89	9.5	44.2	Central portion of ARNWR
372M	08/03/92	38.8	1.9	Private land south of ARNWR
382F	08/03/92	38.8	1.9	Private land south of ARNWR
392M	08/01/89	3.2	37.7	Private land south of ARNWR
394F	08/01/89	3.2	38.0	Central portion of ARNWR
517M	08/03/92	3.5	1.9	Private land south of ARNWR
518M	08/03/92	3.5	1.9	Private land south of ARNWR
519M	08/03/92	3.5	1.9	Private land south of ARNWR
523F	08/03/92	3.5	1.9	Private land south of ARNWR

<sup>a</sup> - Number of months in the wild does not necessarily span the period from the date of release through September 30, 1992, as some captive-born wolves were returned to captivity for varying periods of time and were subsequently rereleased.

TABLE 9 - Red wolves born in the wild in northeastern North Carolina from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Parents (Male/Female)	Year/ Birth Date <sup>a</sup>	Period(s) Monitored	No. of Months Monitored	Comments
344F	211/196	<u>1988:</u> 05/05/88	04/16/89 - 09/11/92	40.8	Presumed still alive. Died 01/24/91.
351F	184/205	04/28/88	11/10/88 - 01/24/91	26.4	
442M	319/300	<u>1990:</u> 05/07/90	09/11/90 - 11/24/90 02/05/91 - 09/30/92 Total Months Monitored -	2.4 <u>19.8</u> 22.2	
443F	319/300	05/07/90	10/02/90 - 08/20/92 09/04/92 - 09/30/92 Total Months Monitored -	22.5 <u>0.9</u> 23.4	
444F	319/300	05/07/90	01/23/92 - 09/30/92	8.2	
496F	328/313	<u>1991:</u> 04/15/91	09/18/91 - 09/30/92	12.4	Died 12/15/91. Observed 06/08/91; fate unknown.
497M	328/313	04/15/91	09/30/91 - 09/30/92	12.0	
498F	328/313	04/15/91	09/30/91 - 12/15/91	2.5	
499?	328/313	04/15/91	----- - -----	----	
500F	392/344	05/01/91	08/15/91 - 09/30/92	13.5	

Table 9 (continued)

Wolf No. and Sex	Parents (Male/Female)	Year/ Birth Date <sup>a</sup>	Period Monitored	No. of Months Monitored	Comments
501F	392/344	05/01/91	08/15/91 - 08/30/91 10/18/91 - 09/30/92 Total Months Monitored -	0.5 <u>11.4</u> 11.9	
502F	392/344	05/01/91	08/23/91 - 09/30/92	13.2	
503F	392/344	05/01/91	10/18/91 - 09/30/92	11.4	
504F	392/344	05/01/91	10/18/91 - 09/30/92	11.4	
505F	331/205	04/28/91	10/31/91 - 09/30/92	11.0	
506M	331/205	04/28/91	11/15/91 - 09/30/92	10.5	
507M	331/205	04/28/91	11/17/91 - 09/30/92	10.5	
508M	331/205	04/28/91	08/02/92 - 09/30/92	1.9	
509?	319/300	04/30/91	----- - -----	----	Observed 06/10/92; presumed alive.
580?	319/300	<u>1992:</u> 05/06/92	----- - -----	----	Observed 09/07/92; presumed alive.
581?	319/300	05/06/92	----- - -----	----	Observed 09/07/92; presumed alive.

Table 9 (continued)

Wolf No. and Sex	Parents (Male/Female)	Year/ Birth Date <sup>a</sup>	Period(s) Monitored	No. of Months Monitored	Comments
582?	319/300	05/06/92	----- - -----	----	Observed 09/07/92; presumed alive.
<sup>a</sup> - Birth dates are estimated from monitoring the movements of the parents.					

TABLE 10 - Mortality of red wolves born in the wild in northeastern North Carolina from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Date of Death	Age at Death (Months)	No. of Months in the Wild	Cause of Death
351F	01/24/91	32.9	32.9	Intraspecific aggression
498F	12/15/91	8.1	8.1	Vehicle

TABLE 11 - Information about dispersal by red wolves born in the wild in northeastern North Carolina from September 14, 1987, through September 30, 1992.

Wolf No. and Sex	Birth Date	Dispersal		Distance/ Direction Traveled	Comments
		Date <sup>a</sup>	Age (Months)		
344F	05/05/88	03/05/90	22	22 km SW	Breeding female <sup>b</sup>
351F	04/28/88	-----	--	-----	Died 01/24/91
442M	05/07/90	01/10/92	20	21 km SW	Lone male
443F	05/07/90	10/21/91	17	21 km SW	Lone female
444F	05/07/90	-----	--	-----	Associating with parents
496F	04/15/91	12/25/91	8	35 km SW	Lone female
497M	04/15/91	11/25/91	7	79 km W	Lone male
498F	04/15/91	11/15/91	7	13 km S	Died 12/15/91
499?	04/15/91	?????????	??	?????????	Not yet captured <sup>c</sup>
500F	05/01/91	-----	--	-----	Associating with parents
501F	05/01/91	-----	--	-----	Associating with parents
502F	05/01/91	-----	--	-----	Associating with parents
503F	05/01/91	09/01/92	16	192 km W	Lone female
504M	05/01/91	-----	--	-----	Associating with parents
505F	04/28/91	02/09/92	10	85 km W	Lone female
506M	04/28/91	-----	--	-----	Associating with parents
507M	04/28/91	-----	--	-----	Associating with parents
508F	04/28/91	-----	--	-----	Associating with parents
509?	04/30/91	?????????	??	?????????	Not yet captured <sup>d</sup>

Table 11 (continued)

Wolf No. and Sex	Birth Date	Dispersal		Distance/ Direction Traveled	Comments
		Date <sup>a</sup>	Age (Months)		
580?	05/06/92	-----	--	-----	Not yet captured <sup>e</sup>
581?	05/06/92	-----	--	-----	Not yet captured <sup>e</sup>
582?	05/06/92	-----	--	-----	Not yet captured <sup>e</sup>

<sup>a</sup> - No date is listed for wolves that did not disperse or are believed to have not dispersed from their natal area. A question mark is shown for wolf number 499 because we have no information about the movements of this animal.

<sup>b</sup> - The radio collar on wolf number 344 malfunctioned sometime between September 8 and 11, 1992. She is presumed to have survived through September 30, 1992.

<sup>c</sup> - Wolf number 499? was observed 06/08/91; fate is unknown.

<sup>d</sup> - Wolf number 509? was observed on 06/10/92; presumed still alive.

<sup>e</sup> - Pups numbered 580?, 581?, and 582? were observed in the natal area on September 7, 1992, and are believed to still be in the area, associating with their parents.