July 30, 2018

To: U.S. Fish and Wildlife Service

We, the undersigned scientists, submit the following comments on the U.S. Fish and Wildlife Service (Service) notice of intent to "propose to replace the existing regulations governing the nonessential experimental population designation of the red wolf (*Canis rufus*) under section 10(j) of the Endangered Species Act," as published in the *Federal Register* of June 28, 2018 (Docket No. FWS-R4-ES-2018-0035).

On May 23, 2017, the Service published a notice of intent to prepare a Draft Environmental Assessment for Proposed Replacement of the Regulations for the Nonessential Experimental Population of Red Wolves in northeastern North Carolina (Draft EA). This established a 60-day period to solicit public comments on the scope of issues to be addressed in the Draft EA. On July 24, 2017, several of us signed a letter (Appendix A) urging the Service to:

1. Restore the Red Wolf Recovery Program (Program) in eastern North Carolina to its capacity prior to 2014;
2. Establish an effective management response to mitigate mortality through stronger regulatory mechanisms to protect red wolves;
3. Continue ongoing research and develop further methodology to control hybridization and other threats to the reintroduced population;
4. Improve public perception of red wolves through tailored education and outreach programs for hunters and the public;
5. Work with the local public and government to facilitate cooperation without curtailment of the Program.

After receiving that letter, along with 54,992 public comments (99.8% of the total comments; Wildlands Network 2018), during the 2017 60-day scoping period, which also expressed strong support for maintaining a wild population of red wolves in North Carolina, the Service proposed revising the 10(j) rule using its preferred alternative management action ("Alternative 3") to:

1. Reduce the Red Wolf Experimental Population Area (RWEPA) by 87% (6,500 km^2 to 825 km^2) by restricting the North Carolina Nonessential Experimental Population (NC NEP) to Alligator River National Wildlife Refuge (ARNWR) and Dare County Bombing Range;
2. Reduce the NC NEP by 90% (150 wolves to 15 wolves) by managing a small group of red wolves on federal land in Dare County;
3. Allow the legal take of red wolves that traverse off federal lands in Dare County by removing all prohibitions on the take of wolves on private and state lands;
4. Re-implement the Red Wolf Adaptive Management Plan (RWAMP) to manage a small group of wolves on ARNWR and Dare County Bombing Range as a propagation site for future reintroductions.

In this letter we address the Service's proposed changes to the 10(j) rule to reduce the NC NEP to a small group of 10–15 red wolves as a potential source of animals for future experimental populations, as well as to expose these wolves to legal take when they traverse off federal lands.

These actions proposed by the Service undermine red wolf recovery and emphasize misconceptions about public support for maintaining a wild red wolf population in North Carolina and coyote management in the region. Despite the notions asserted in the proposed rule change, a significant body of scientific evidence indicates that recovery efforts in North Carolina have been successful and should be continued. Therefore, it is important for the Service to recognize the success of the Program, adopt Alternative 2 (or a slightly modified version thereof) of its proposed rule changes, and then restore the Program to pre-2014 capacity.

Below, we have provided comments as sought by the Service in its proposed rule changes (USFWS 2018, page 30383) regarding the following:

"Contribution of the NC NEP to recovery goals for the red wolf"

According to the Service's Red Wolf Species Survival Plan (USFWS 1990), its recovery strategy called for establishing three or more wild populations targeting approximately 220 wolves within the species' historic range. The Program successfully established a wild population of red wolves in northeastern North Carolina and, from 2000 to 2014, managed 110–155 red wolves in the RWEPA (Gese et al. 2015; Hinton et al. 2017*a*). This represented 50–70% of the targeted wild population size set by the Service's recovery strategy. The NC NEP represents one of the first instances of a species, considered extinct in the wild, being re-established therein from a captive population. Furthermore, the Program served as a testing ground for remarkable techniques, some now widely used in wildlife conservation, including those involving acclimation of captive-born animals to the wild, genetic monitoring, cross-fostering captive-born pups into wild litters, and the use of sterilized canids that serve as "placeholders" to preclude hybridization (Bartel and Rabon 2012; USFWS 2007). These accomplishments served as a model for subsequent wolf reintroductions, particularly those of the gray wolf (*Canis lupus*) to the American Southwest and the Yellowstone region (Carley 2000; Phillips et al. 2003).

Site-specific management is fundamental to restoring wild populations of red wolves and channeling limited research efforts into specific areas of concern is crucial for improving conservation strategies. To accomplish this, the Program successfully collaborated with scientists to study the NC NEP and evaluate ways to minimize threats to recovery by:

1. Clarifying red wolf taxonomy (Nowak 1992, 1995*a*, *b*, 2002; Phillips and Henry 1992; Nowak and Federoff 1998; Hedrick et al. 2002; Murray and Waits 2007; Brzeski et al. 2016; Waples et al. 2018);
2. Establishing noninvasive techniques for monitoring hybridization (Adams et al. 2003, 2007; Adams and Waits 2007; Miller et al. 2003; Bohling et al. 2013);
3. Understanding factors facilitating hybridization and assortative mating (Fredrickson and Hedrick 2006; Bohling and Waits 2011, 2015; Bohling et al. 2016; Hinton et al. 2018);
4. Describing the external morphometrics of red wolves, coyotes, and their hybrids (Hinton and Chamberlain 2014);
5. Evaluating red wolf survival and population trends (Sparkman et al. 2011a; Murray et al. 2015; Hinton et al. 2017*a*, *b*);
6. Assessing the effects of inbreeding (Sparkman et al. 2012; Brzeski et al. 2014);
7. Evaluating disease occurrence in red wolves and coyotes (Brzeski et al. 2015);
8. Describing pack dynamics (Hinton and Chamberlain 2010; Sparkman et al. 2011*b*, 2012);

9. Examining dispersal behavior (Sparkman et al. 2011*b*; Karlin and Chadwick 2012);
10. Assessing red wolf diet, space use, and habitat selection (Chadwick et al. 2010; Hinton and Chamberlain 2010; Dellinger et al. 2011, 2013; McVey et al. 2013; Hinton et al. 2016, 2017*b*);
11. Assessing coyote diet, space use, and habitat selection (McVey et al. 2013; Hinton et al. 2015*a*, 2017*b*);
12. Evaluating coyote management (Gese and Terletzky 2015);
13. Identifying potential reintroduction sites (van Manen et al. 2000);
14. Evaluating and summarizing management strategies (Stoskopf et al. 2005; Hinton et al. 2013, 2015*b*, 2017*a*, *b*; Gese et al. 2015; Murray et al. 2015; Way 2015; Simonis et al. 2018).

A major impediment to red wolf recovery is the limited knowledge of red wolf ecology. Although much work remains to be done, information and experience gained from nearly 30 years of restoration efforts have made crucial contributions to the future of the red wolf and other imperiled species. This work has identified areas of investigation that are of direct relevance to the restoration of red wolves in North Carolina and other regions of its historic range.

"The relative effects that management of the NC NEP under the proposed rule would have on the conservation of the species"

There is a pressing need to establish and maintain a viable, dynamic, and self-sustaining red wolf population in the wild. Implementation of the Service's preferred alternative action would mark the winding down and eventual termination of federal efforts to recover red wolves in the wild in North Carolina. After three decades of unprecedented progress and success towards returning red wolves to the wild, it would be ultimately irresponsible for the Service to restrict the NC NEP to a small fraction of the current RWEPA. Federal lands in Dare County cannot alone support a viable wild red wolf population. Because the Program maintained the NC NEP at 110–150 red wolves in the five-county RWEPA that encompassed approximately 6,500 km^2 (Gese et al. 2015; Hinton et al. 2017*a*), we believe the Service should establish a permanent red wolf management area in eastern North Carolina. We understand there are other interests who oppose any presence of the wolf in this area, but it is the Service's legal obligation to consider the best available science to mitigate threats and opposition to the NC NEP.

We believe Alternative 2, or a slightly modified version thereof, proposed in the Draft EA offers the best opportunity to reduce human opposition, while saving the NC NEP and supporting program. The possibility of modification of Alternative 2 would consider some flexibility of the size of the involved area. We believe there must be an area of sufficient size to allow concentration of resources for securing a viable wolf population against both human hostility and hybridization. The area should be equivalent to the current RWEPA or some other zone that has been carefully delineated in keeping with the objective of maintaining a viable, dynamic, and self-sustaining red wolf population. In any case, such a zone must cover a continuous block of territory that is substantially larger area than the federal lands of Dare County. All coyotes and hybrids should be humanely controlled, and their presence minimized in that area. Other means of controlling coyotes within the area should be considered, including, to the extent feasible in strategic areas of the Albemarle Peninsula, the type of fencing that has been successful against the Australian dingo (Corbett 2008; Hayward and Kerley 2009).

"The extent to which the NC NEP may be affected by existing or anticipated Federal or State actions or private activities within or adjacent to the proposed NC NEP management area"

We believe implementing the Service's preferred management action will significantly increase the extinction probability of the NC NEP in several ways. First, shooting deaths of red wolves were correlated with a significant increase in breeding pair disbandment (Sparkman et al. 2011; Hinton et al. 2017*b*), disruption of wolf packs (Bohling and Waits 2015; Hinton et al. 2017*b*), and facilitation of coyote encroachment and hybridization (Bohling and Waits 2015; Hinton et al. 2015*a*, 2017*b*, 2018) simultaneous with the decline in annual red wolf population size and growth rate (Hinton et al. 2017*a*). For this reason, Alternative 3's removal of procedural provisions for the take of red wolves off ARNWR and Dare County Bombing Range is unacceptable, as it legalizes and promotes the primary threat to the NC NEP – anthropogenic mortality.

Second, maintaining a small group of 10–15 red wolves would likely exacerbate problems associated with inbreeding and hybridization. No other wild red wolf population exists and, consequently, the NC NEP is susceptible to the effects of inbreeding because of its isolation and limited choice of mates (Sparkman et al. 2012; Brzeski et al. 2014). Issues associated with inbreeding include decreasing reproductive rates and increasing susceptibility to environmental change and disease (Rabon and Waddell 2010, Hinton et al. 2013; Brzeski et al. 2014, 2015). Inbreeding was also found to have a negative effect on red wolf body size such that the more inbred individuals were smaller (Brzeksi et al. 2014). This is problematic for controlling hybridization, as it was reported that smaller red wolves had a greater probability of consorting and hybridizing with coyotes than larger wolves (Hinton et al. 2018).

The Program has relied on the release of captive-born wolves via acclimated releases of juvenile and adult wolves or cross-fostering pups in wild litters (Bartel and Rabon 2012; Gese et al. 2015) to reduce inbreeding. However, maintaining one or two packs of red wolves within a small area would reduce the effectiveness of these techniques, as the release of juvenile and adult wolves onto federal lands does not guarantee that they will replace a lost red wolf breeder. Release of solitary wolves tends to be unsuccessful in most cases, ending with wolves being killed while homing for their original capture site (McLellan and Rabon 2006). Undoubtedly, these released captive-born wolves would traverse off federal lands and be exposed to legal take by the public or pair bond and hybridize with coyotes.

Finally, failure to manage coyote presence and hybridization on private lands adjacent to ARNWR and Dare County Bombing range would likely be problematic for managing a small group of red wolves in the presence of a numerically superior canid competitor (Hinton et al. 2015*b*). Juvenile red wolves on federal land would disperse into adjacent private lands seeking opportunities to find wolf mates and establish territories. The absence of red wolves outside federal lands would ensure that dispersing wolves pair bond with coyotes and create hybrid canids (Hinton et al. 2018). Body sizes of red wolves and coyotes are distinct from one another and hybridization between red wolves and coyotes guarantees the existence of intermediate-sized canids in the RWEPA (Hinton and Chamberlain 2014). The discrepancy in body mass ensures that red wolves are capable of displacing and killing coyotes (Gese and Terletzky 2015). Adult hybrids are statistically larger than coyotes and typically weigh about 6 kg less than red wolves (Hinton and Chamberlain 2014). Allowing hybridization to occur in adjacent areas would facilitate increasing the average body mass of *Canis* taxa adjacent to ARNWR and Dare County

Bombing Range and permit the influx of larger body-sized canids onto federal lands. The ability of individual red wolves to competitively exclude coyotes and hybrids will be eroded if management strategies allow the creation of a larger hybridized population capable of interacting with an isolated group of 10–15 red wolves.

"Appropriate provisions for protections and "take" of red wolves"

The Service's rule changes were proposed to "establish a fundamentally different paradigm for red wolf conservation" (USFWS 2018, page 30385). Unfortunately, the fundamental change lies in the Service's preference for Alternative 3 that proposes to remove the procedural provisions for the take of red wolves outside of ARNWR and Dare County Bombing Range. Red wolves in the NC NEP have always received protection within and outside the RWEPA. According to the 1995 final rules (USFWS 1995), language at (c)(4)(vi) provides the same protection for red wolves outside the current five-county RWEPA as for those within. The best available science has repeatedly indicated that red wolf mortality caused by gunshot has increased since 2005 and poses the most serious threat to the reintroduced population because it stagnates population growth (Sparkman et al. 2011; Gese et al. 2015; Hinton et al. 2017*a*), disrupts breeding pairs and wolf territories (Hinton et al. 2017*b*), and increases the likelihood of red wolf hybridization with coyotes (Bohling and Waits 2011; Bohling et al. 2016; Hinton et al. 2017*b*, 2018). Therefore, we believe that the adoption of Alternative 2, or a slightly modified version thereof, is the best approach to pursue recovery, as it retains the protections provided by the 1995 final rules.

In the Draft EA (also see Miranda 2015), the Service contends that removing the procedural provisions for the take of red wolves outside of ARNWR and Dare County Bombing Range will garner public support. Without solid evidence to support its claims in the Draft EA, it is incorrect for the Service to assume that eliminating protection for red wolves would improve local support and achieve beneficial conservation outcomes (Chapron and Treves 2016*a*, *b*). Research on tolerance for carnivores has made significant advances in the past 10 years and we are concerned that the Service is confusing *tolerance for wolves* with *antipathy toward the agency* (Treves and Bruskotter 2014; Bruskotter et al. 2015). While both attitudes play an important role in red wolf recovery, they are not always strongly associated (Heberlein 2012), in part, because there are often substantial barriers to engaging in illegal behaviors (Ajzen and Fishbein 2005; Bruskotter and Fulton 2012). In this case, anthropogenic mortality is the primary behavior threatening the NC NEP (Hinton et al. 2017*a*). Recently, the Service's approach to mitigating intolerance was to issue a 'take' permit to a landowner (Bonner 2014), which prompted another landowner to a seek permit as well. The second 'take' permit resulted in the willing take of a red wolf (Hampton 2015; Miranda 2015; Weaver 2015), a formerly illegal behavior. Our concern is that the Service's preferred strategy to remove protections for red wolves will actually increase anthropogenic mortality (by removing barriers to killing wolves), while having little effect on attitudes, especially if those attitudes are rooted in other factors (e.g., dislike/distrust of government). Indeed, several lines of research discourage liberalizing killing as an intervention intended to raise tolerance (Hogberg et al. 2015; Treves and Bruskotter 2014). Instead, liberalizing killing by relaxing protections for carnivores seems to trigger more calls for killing carnivores (Browne-Nuñez et al. 2015) and more illegal killing (Chapron and Treves 2016*a*, *b*, 2017).

Nor do we believe relaxing prohibitions on the take of red wolves is an effective strategy for increasing positive attitudes toward wolves. We have learned from correlational, before-and-after longitudinal studies, and experimental manipulations that tolerance for carnivores declines when negative information is shared more often by authorities than positive information about carnivores (Shelley et al. 2011; Slagle et al. 2013; Treves et al. 2013). Therefore, the Service should strive to emphasize the real and varied benefits of red wolves to ecosystems, to current, non-extractive users, and for future generations wishing to see red wolves in the wild (Slagle et al. 2013).

We are concerned that the Service's strategy is aimed to reduce antipathy toward the Service among local landowners, rather than to reduce intolerance for red wolves. Recently published research shows that neither attitudes toward wolves, trust in the Service, nor support for the Endangered Species Act differed among regions with dramatically different experiences with wolf recovery. These data suggest attitudes --both toward wolves and the Service-- are relatively insensitive to policy changes (Bruskotter et al 2018). Thus, while we recognize that both reduced antipathy for the Service and increased positive attitudes toward wolves are desirable outcomes, we believe those outcomes are not likely to be facilitated by the Service's preferred action to remove protection of red wolves on private and state lands. Perhaps more importantly, the proposal is not likely to be an effective means of addressing the fundamental problem – human-caused mortality.

Therefore, to ensure that recovery efforts are successful, the Service must carefully monitor all killing of red wolves in the RWEPA. As reported by Hinton et al. (2017*a*), the NC NEP experienced decreased survival rates in October–December. Approximately 30% of the RWEPA consists of agricultural fields where agricultural activities influence availability of vegetation cover for red wolves (Chadwick et al. 2010, Hinton and Chamberlain 2010; Dellinger et al. 2013; Hinton et al. 2016). Harvest of agricultural crops occurs just prior to fall and winter hunting seasons, and extensive loss of vegetation cover reduces refugia for red wolves during a period of elevated human activity. At this time of the year red wolf pups are 5–8 months old, all are without radio-collars, and they encounter significant decreases in availability of vegetation cover and increases in human activity for the first time. For this reason, Alternative 3's standard that red wolf takes only need be reported to the Service if the deceased wolf is collared is unacceptable because it eliminates accurately measuring rates and causes of mortalities that are essential for proper management of wolf populations (Treves et al. 2017). Only Alternative 2 requires that all take – even potential take – be reported immediately to the Service, and as such it is the only acceptable course of action. The Service should establish an effective response to mitigate human-caused mortalities and, when appropriate, investigate, arrest, and prosecute the illegal take of red wolves. Non-lethal removal of red wolves should be carried out by the Service field team or a designated representative. Within the Recovery Area, coyote hunting of any kind should continue to be banned on federal lands and state lands and carefully regulated on private lands.

There is considerable evidence that protection of eastern wolves (*Canis lycaon* or *Canis lupus lycaon*) both in and around Algonquin Provincial Park, while establishing restrictions and protocols for hunting and trapping coyotes, allowed re-expansion to the point at which the population naturally retains its genetic distinctiveness, without active human management (Wilson et al. 2009; Rutledge et al. 2010, 2012). We believe the Service could improve

Alternative 2, and the conservation of red wolves, by adopting strategies used in southeastern Canada to recover the eastern wolf population in Algonquin Provincial Park.

"Ideas and strategies for promoting tolerance of red wolves on private property outside the NC NEP management area"

There has been tremendous collaboration between the Service and local landowners to promote red wolf recovery (Phillips et al. 2003; Beeland 2013). The Wildlife Management Institute report acknowledged the importance of these relationships in recovery efforts (WMI 2014). Releases of red wolves on private lands involved cooperation between the Service and landowners, in contrast to the perception that wolves were constantly released against the wishes of landowners. Holding red wolf recovery to expectations made almost 30 years ago is unfair and ignores decades-long partnerships between the Service, landowners, and other stakeholders. It also runs contrary to wildlife management practices across the United States. Public-private partnerships are central to the efforts of wildlife agencies across the country, especially in the eastern US. The Service is establishing a dangerous precedent by declaring that private lands are off-limits for the release and recovery of wildlife species, especially if landowners feel they are negatively impacted by such actions.

The Service should improve its relations with local residents via outreach, advocacy, and cooperation for the promotion of the NC NEP. Alternative 2 includes initiatives to seek out private landowners who would voluntarily partner with the Service to have red wolves released on their property, whereas Alternative 3 relies on private actors to cooperate with the Service in eradicating the NC NEP from private lands. Many landowners and private trappers were cooperatively working with the Program to manage the NC NEP (Beeland 2013; WMI 2014) and the Service should use such relationships as a starting point to facilitate participation by residents in recovery efforts.

A positive first step towards promoting tolerance of red wolves on private property should start with the Service acknowledging that the RWAMP was successfully used by the Program to lower coyote presence in the five-county RWEPA. Although it is acknowledged that coyote abundance on the Albemarle Peninsula has increased in recent decades (Gese et al. 2015, Hinton et al. 2017*b*), coyote densities on the peninsula have largely been unknown. However, using the Service's trap line data from the RWEPA, Hinton et al. (2017*b*) reported that, by 2014, the ratio of coyotes to red wolves on the Albemarle Peninsula was approximately 2:1. With the inclusion of hybrids, the ratio of coyotes and hybrids to red wolves was approximately 2.5:1. The Peninsula is approximately 6,500 km^2 and these estimates derived from Hinton et al. (2017*b*) suggest that coyote density was approximately 0.04 coyotes/km^2 by 2014. This estimate is considerably smaller than the range of 0.2–2.3 coyotes/km^2 reported by studies conducted in the southeastern United States (see Table 22.2 in Bekoff and Gese 2003) and may indicate that the combination of red wolf presence and fertility control suppressed coyote density in the RWEPA.

Red wolf recovery has always operated under some level of conflict, and the Program found solutions while managing wolves under complex relationships between local communities and federal agencies. This success is evident by the extensive trapping of coyotes on private lands in the RWEPA (Appendix B). The best individuals for promoting tolerance for the NC NEP have been Service biologists who used flexible thinking, negotiation skills, and the ability to compromise to advance recovery goals, and we suggest that the Service continue leading efforts

that align the interests of the public, scientific community, and conservation organizations to support the NC NEP. This can be achieved by working with conservation organizations to improve public perception of red wolves through tailored education and outreach programs for hunters, landowners, and the public, as well as by working with the local and state government to facilitate cooperation without curtailing the Program.

"Appropriate means to evaluate the effectiveness of the proposed action, including relevant performance measures"

The Program expanded the extent of the NC NEP from approximately 480 km^2 of federal land to approximately 6,500 km^2 of federal, state, and private lands over a 25-year period. Clearly, expanding efforts to include an area two-thirds the size of Yellowstone National Park was accomplished with the involvement of private landowners and local communities. Distrust between local communities and government agencies is common in wildlife management, and problems involving red wolves are interconnected with other management issues, such as coyote control. In the Draft EA, the Service asserted that there was a significant loss of support by landowners in the RWEPA due to the issue of coyote control. However, the Service provided no data to support this claim. Therefore, it would be difficult to evaluate the effectiveness of the Service's proposed actions because of the absence of baseline data to compare consequences of future management actions. Regardless, we believe there is broad support and broad access to private lands in the RWEPA for the NC NEP for two reasons.

First, a considerable amount of research conducted by scientists in the RWEPA, as described in peer-reviewed publications, strongly suggests that access to private lands was not a serious problem. For instance, Figure 1 of Adams et al. (2007) shows that 9 of their 12 sampling areas were on private lands. Hinton and Chamberlain (2010) acknowledged that their study areas comprised mostly private lands, as did Hinton et al. (2015*a*, 2016, 2017*c*). Figure 1 of Chadwick et al. (2010) shows that the three packs monitored in their study occurred on private lands. Similarly, Figure 1 of Dellinger et al. (2011) shows that five of six packs monitored in their study occurred on private lands. Figure 3 of Bohling et al. (2016) clearly shows that the majority of their sampling occurred on private lands.

Second, the Responsive Management Report conducted for the North Carolina Resources Commission to determine the perspectives and views of residents in the RWEPA regarding coyotes and red wolves, the management of those species, and the Program reported that 15% (n = 2,577) of residents believed that red wolves were a problem (Responsive Management 2016). This suggests that 85% of residents were either supportive or indifferent to the presence of red wolves. Similarly, 67% of residents who responded to the survey believed that "coyotes do NOT cause me any problems" and 40% of residents responded that they would take no action when observing a coyote on their property. Similar to red wolves, it appears that most residents in the RWEPA did not see coyotes as a problem on their property.

Therefore, we believe the Service should be more transparent about methods and decision criteria used to evaluate public support and access to private lands for its proposed rule changes. It is likely that support for red wolves has degraded in recent years and access to private lands may have been lost, but this claim is difficult to evaluate without the availability of relevant data. For example, what set of measurements for landowner support and access to private lands convinced the Service that management of NC NEP throughout the RWEPA was not feasible?

The process of using scientific information to make policy decisions about the fate of the NC NEP is complex and we believe the Service should demonstrate that its judgements are aligned with the best scientific information available when deciding the fate of the NC NEP.

For all these reasons, we the undersigned submit this letter in support of Alternative 2 (or a slightly modified version thereof) of its proposed rule changes that restores the Program to pre-2014 capacity, and against Alternative 3. We urge Service to take all actions necessary to recover red wolves in the wild, and continued support by the Service in eastern North Carolina is vital to the long-term prospects of the species. Thank you very much for taking our concerns into account.

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