# Executive Summary: Workshop on Interactions of Human-Caused Mortality, Genetic Introgression, and Management among Wild Red Wolves: Developing Scientific Consensus

*Held at the Marriott Hotel in Atlanta, Georgia,*

*On May 24 – 26, 2016*

*Prepared by the Workshop Planning Team*

After being nearly driven to extinction by the combination of human persecution, human-caused habitat change, and subsequent hybridization with coyotes, red wolves (*Canis rufus*) were rescued from extinction by the establishment of a captive breeding program in 1973. In 1987, red wolves were first released into a coyote-free (*Canis latrans*) area in northeastern North Carolina. But by the early 1990's coyotes began colonizing the area, and pairings between red wolves and coyotes were first detected in 1993. In 2000, a program to contain hybridization and introgression by sterilizing coyotes and removing hybrids began. Genetic assignment tests were used to determine which canids were red wolves, hybrids, and coyotes. But despite these management efforts, the number of red wolves in the reintroduced population has remained around 100. Given these additional sources of uncertainty surrounding hybridization and the potential increase in introgression along with the existing challenges for survival of red wolves as individuals and a species, the success of the recovery program remains unclear. We convened an expert workshop to investigate, address, and seek scientific consensus for two primary interrelated questions at the source of the uncertainty: (a) how does human-caused mortality affect reproductive barriers among red wolves and coyotes; and (b) at what biological point should genetic introgression prompt the delisting of red wolves? These two objectives are critical steps in the management process required to guide strategic planning and conservation for the species.

We convened a workshop on May 24-26 in Atlanta, GA involving world-class, leading experts in endangered species policy/law, as well as in conservation genetics, taxonomy, and population biology, with special focus on canids and red wolves in particular. The workshop planning team (Pacifici, Mills, Fredrickson, Smith, and Collazo) used best practices for eliciting information from experts to identify and invite scientific experts to participate in the workshop (Burgman 2005). The planning team first identified three main areas of interest relevant to the workshop: Conservation genetics/hybridization, Wolf/Coyote Biology, and ESA Law/Policy. Then, the planning team reviewed the literature to identify experts who had authored studies or participated in research relevant to these three main areas. We used selection criteria based on an expert's professional credentials, position, area of expertise, and experience to develop a list of potential invitees. Part of the process was to ensure that we had representative groups from differing and competing scientific viewpoints. In addition, we were less interested in having all of the wolf/coyote biologists in the room because the focus of the workshop was less about wolf/coyote management and more about genetics and policy therefore we limited the number of

wolf/coyote biologists on the list of potential invitees. These criteria helped ensure that the invitations to participate were made only to scientific experts familiar with the topic and that the selections were transparent, unbiased, and captured a broad diversity of expertise and professional judgments related to the topics of interest.

The main contribution of the workshop was the evaluation of the main competing evolutionary origin hypotheses for the Red Wolf. Specifically, whether the Red Wolf was a listable entity under the ESA. Under all scenarios it was clear there was a logical and valid pathway to make a determination that the red wolf is a listable entity. Under the three hypotheses that have scientific evidence (2 species, 3 species, or 4 species) there was unanimous support by the participants for the red wolf to be a listable entity. This of course does depend on the interpretation of a DPS, but all participants recognized the logical and credible path that would lead to a listable entity.

The participants were not comfortable discussing the degree of support for each of these different hypotheses and suggested that an independent team would be better suited to handle that task as many of the participants had played critical roles in putting forth and supporting either of the 2 species or 3 species hypotheses in the scientific literature. Ideally, an unbiased and qualified group could determine pursue this next step, but this was not something this group could effectively evaluate in an unbiased fashion and therefore we withheld from expressing degree of support for the different hypotheses.

The agreed upon summary of the workshop is below:

- A majority of the group concluded that the red wolf was listable and that it continues to be listable under all plausible evolutionary hypotheses.
- There was strong agreement that a number of factors including hybridization with coyotes, high human-caused mortality particularly gun shots, low public support, small population size lead to poor prospects for success of the reintroduction project in northeastern NC. The group discussed how to phase out the reintroduction project in northeastern NC.
- Many emphasized the importance of continuing the recovery program and of finding alternative reintroduction locations.
- There are many important scientific understandings derived from the northeastern NC reintroduction project that will assist red wolf and other species reintroductions, and the group discussed the importance of continued monitoring as the project changes.

This workshop was one component of the Service's information gathering process for the Red Wolf Recovery Program. Information gathered during the workshop will be used by the Service in conjunction with other published literature or information submitted by interested parties to evaluate the status of the Red Wolf Recovery Program. The Service is committed to using the best available scientific and commercial information, and will incorporate new information as it becomes available.