

DEPARTMENT OF THE INTERIOR**Fish and Wildlife Service****DEPARTMENT OF COMMERCE****National Oceanic and Atmospheric Administration****50 CFR Part 424****RIN 1018-AC54****Endangered and Threatened Wildlife and Plants; Proposed Policy and Proposed Rule on the Treatment of Intercrosses and Intercross Progeny (the Issue of "Hybridization"); Request for Public Comment**

AGENCIES: Fish and Wildlife Service, Interior; National Marine Fisheries Service, NOAA, Commerce.

ACTION: Proposed rule.

SUMMARY: The Fish and Wildlife Service and the National Marine Fisheries Service (Services) propose a policy that will include, within the scope of a listing for a specific taxon, "hybrid" individuals that more closely resemble a parent belonging to a listed species than they resemble individuals intermediate between their listed and unlisted parents. The Services propose to add to their joint regulations the terms "intercross" and "intercross progeny" and indicate the inclusion of intercross individuals within the original listing action for the parent entity.

The proposed policy is intended to allow the Services to aid in the recovery of listed species by protecting and conserving intercross progeny, eliminating intercross progeny if their presence interferes with conservation efforts for a listed species, and fostering intercrossing when this would preserve remaining genetic material of a listed species. The proposed policy would only sanction these actions where recommended in an approved recovery plan, supported in an approved genetics management plan (which may or may not be part of an approved recovery plan), implemented in a scientifically controlled and approved manner, and undertaken to compensate for a loss of genetic viability in listed taxa that have been genetically isolated in the wild as a result of human activity. Nothing in this regulation would excuse compliance with section 10 of the Endangered Species Act.

DATES: Comments on this proposal must be received by April 8, 1996 in order to be considered in the final decision on this proposal.

ADDRESSES: Comments and materials concerning this proposal should be sent to the Chief, Division of Endangered Species, Mail Stop 452, Arlington Square, U.S. Fish and Wildlife Service, Washington, D.C. 20240. Comments and materials received will be available for public inspection, by appointment, during normal business hours in Room 452, 4401 North Fairfax Drive, Arlington, Virginia 22203.

FOR FURTHER INFORMATION CONTACT: Jamie Rappaport Clark, Chief, Division of Endangered Species, at the above Washington, D.C. address, (703/358-2106).

SUPPLEMENTARY INFORMATION:**Background**

The Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*), requires the Services to identify, protect, manage, and recover species of plants and animals in danger of extinction. To carry out this responsibility, the Services are required to rely on the best available scientific and commercial information and to develop sound policies to use that information in conserving endangered and threatened species and the ecosystems on which they depend. By implication, the Act also promotes protection of the genetic resources of those species.

Under the definition of "species" found in the Act, the Services can apply the protections of the Act to any species or subspecies of fish or wildlife or plants, or any distinct population segment of any species of vertebrate fish or wildlife that meets the definition of endangered or threatened. The Act does not attempt to define "species" in biological terms, and thus allows the term to be applied according to the best current biological knowledge and understanding of evolution, speciation, and genetics. While the Act does not specifically address reproductive isolation, the inclusion of subspecies and vertebrate population segments in its definition indicated that isolation is not considered absolutely essential for listing; however, it does not rule out using reproductive isolation as a consideration for listing. In the following discussion, the term "species," unless qualified as indicating taxonomic species, is used in the sense of the Act to include species, subspecies, and distinct population segments of vertebrates within a taxonomic species.

Advances in scientific methodology have altered some traditional concepts of taxonomic species and hybridization. Molecular genetic studies (e.g., DNA

analysis and protein electrophoresis) on both listed and unlisted plants and animals indicate that matings and genetic exchange between related taxonomic species may be more common events than previously believed.

Examples of introgression (the transfer of genetic material from one taxonomic species to another, and its spread among individuals of the second species) are found throughout the plant and animal kingdoms. In some cases, mating with other species and the resulting introgression have apparently been facilitated by a decline in the availability of conspecific mates. Given the low densities of many populations of rare threatened and endangered species, such introgression may be experienced by some listed species.

As a result of this information, the list of species that may contain genetic material traceable to other entities is growing. Consequently, questions have been raised as to how the Services can best deal with individual organisms and entire entities that may contain various levels of "foreign" genetic material.

Previous Service Position. The previous Fish and Wildlife Service position, based upon interpretations in a series of opinions by the U.S. Department of the Interior, Office of the Solicitor, tended to discourage conservation efforts under the authorities of the Act for "hybrids" between taxonomic species or subspecies and the progeny produced by such matings. However, advances in biological understanding discussed earlier prompted the withdrawal of those opinions on December 14, 1990. The reasons for this action are summarized in two sentences in that withdrawal memorandum (Memorandum from Assistant Solicitor for Fish and Wildlife, U.S. Department of the Interior, to Director, U.S. Fish and Wildlife Service, dated December 14, 1990)—"New scientific information concerning genetic introgression has convinced us that the rigid standards set out in those previous opinions should be revisited. In our view, the issue of 'hybrids' is more properly a biological issue than a legal one." This notice contains a proposed policy intended to replace previous positions held by the Services.

Intercross and Intercross Progeny Defined. Due to connotations attached to the various terms that are in general use for matings across taxonomic boundaries and for their products (e.g., cross, hybrid, intergrade, and interbreed), the Services propose to use the neutral term "intercross" for all crosses between individuals of different

species (taxonomic species, subspecies, and distinct population segments of vertebrates). (The use of the term "intercross" was proposed by Dr. John C. Avise at the May 29-30, 1991, meeting of the Captive Breeding Specialist Group, Species Survival Commission, International Union for the Conservation of Nature and Natural Resources.) The phrase "intercross progeny" will be used for descendants of intercross events.

The degree of genetic mixing possible from intercrosses spans a broad continuum. At one extreme are cases in which a small number of individuals of a species display evidence of introgression. Genetic material originating from another entity may remain as evidence of long past and/or infrequent matings with that other entity but may have little or no effect on the morphology and behavior of the organism. At the other extreme are individuals that exhibit morphology that is intermediate between that of the parent types, nuclear DNA showing strong affinities with both parent types, some degree of functional sterility, and/or an inability to "breed true." Somewhere along this continuum there may be individuals that possess DNA from past intercrosses but in most other ways are representative of a single parental stock.

The Services have identified threatened and endangered species that appear to fall at various points along this continuum. Some listed species have been found to contain individuals that appear to be products of introgression; they appear to harbor mitochondrial DNA resulting from introgression, yet there is no morphological or behavioral evidence that introgression has occurred. An apparent example of this condition is the eastern U.S. population of the gray wolf. At the other extreme, the Services have recognized cases in which mixing has reached a point where the species intended for conservation under the Act no longer exists; remaining genetic material is irretrievably mixed with that of another species (e.g., the Amistad gambusia (*Gambusia amistadensis*), which was removed from the list of endangered species in 1987).

While evidence such as similarities in mitochondrial DNA among several entities generally supports findings of introgression, such data may also be explained by alternate hypotheses. One hypothesis that is particularly difficult to rule out involves the retention of common genetic markers from common ancestral stock. Some techniques used to examine mitochondrial DNA are based on comparisons of fragment

lengths of DNA obtained from mitochondria. Differences or similarities in fragment lengths do not necessarily reflect differences or similarities in the genetic codes contained in the fragments.

As molecular genetic methodology advances, it is anticipated that evidence of low levels of introgression and genetic mixing will be commonly found among a variety of organisms. In some cases, all individuals of a species may be found to display low levels of introgression, yet are able to "breed true." The Services find no compelling reason to abandon recovery efforts for recognized species (those whose members morphologically, ecologically, and behaviorally bear close resemblance to one another) due solely to evidence of low-level present or past introgression, even if apparent introgression appears to be geographically widespread.

Populations of plants and animals that are very small, or have gone through a past episode of small population size, may have lost much of their previous genetic variability. In extreme cases, which might be exemplified by the mainland population of the Torrey pine (*Pinus torreyana*) and the cheetah (*Acinonyx jubatus*), population genetic analyses seem to indicate that there is little genetic variation in the remaining population. When genetic variability falls to low levels a species may suffer from a diminished capability to respond to environmental changes and the increased potential for the adverse effects of inbreeding depression (e.g., decreased fertility and/or mating, reduced numbers and survival of offspring). These effects may be catastrophic for a threatened or endangered species, and actions may be necessary to increase genetic variability before the population suffers an irreversible decline.

Proposed Policy for Intercross Progeny. Where intercross progeny are produced as a result of a cross between an individual of a listed taxon and an individual of a taxon that is not listed, the Services believe the responsibility to conserve endangered and threatened species under the Act extends to those intercross progeny if (1) the progeny share the traits that characterize the taxon of the listed parent, and (2) the progeny more closely resemble the listed parent's taxon than an entity intermediate between it and the other known or suspected non-listed parental stock. The best biological information available, including morphometric, ecological, behavioral, genetic,

phylogenetic, and/or biochemical data, can be used in this determination.

This policy will not prohibit the Services from removing intercross progeny from the wild if it is determined that those individuals must be removed to enhance the survival or recovery of the listed species. The action may be authorized under 50 CFR 17.22, 17.32, 17.62, or 17.72, or the protection of the Act may be removed by a special rule adopted under section 4(d) of the Act for threatened species.

Intercrosses between subspecies of the same taxonomic species, or between members of different vertebrate populations of the same taxonomic species or subspecies, are a common, natural, and expected occurrence in nature wherever ranges are adjacent or overlap. As with other intercrosses, the Services will treat the resulting progeny as members of the listed subspecies or population if they share the characteristic traits of that entity. This determination will be based upon the best biological information available.

Species of Hybrid Origin. Some taxonomic species have originated through the intercrossing of two or more other taxonomic species, but have since become stable and self-sustaining biological units. This process of speciation by hybridization is well documented among plants and also is known among fishes, amphibians, and reptiles. Species that are believed to be of hybrid origin would retain or maintain eligibility for threatened or endangered status if they have developed outside of confinement, are self-sustaining, naturally occurring taxonomic species, and meet the criteria for threatened or endangered species under the Act.

Intercross Progeny Produced in Captivity. Unnatural conditions of confinement or confining environments resulting from human activities may produce behavioral and other anomalies that lead to intercrosses that rarely, if ever, occur under "natural" conditions. Resulting intercross progeny are unlikely to benefit the conservation of their listed parent's taxon, and the Services would not generally consider such progeny to be members of a species protected under the Act. However, this proposed policy would extend protection under the Act to intercross progeny produced in captivity, with or without introduction to the wild, where the action is (1) recommended by an approved recovery plan, (2) supported in an approved genetics management plan (which may or may not be part of an approved recovery plan), (3) implemented in a scientifically controlled and approved manner, and

(4) undertaken to compensate for a loss of genetic viability in listed taxa that have been genetically isolated in the wild as a result of human activity. Protection under the Act may apply to the individuals while they are in confinement, after their release to the wild, or during both periods.

Goals of the Proposed Policy. The primary goal of this proposed policy is to provide the Services with the necessary flexibility to deal with diverse intercross situations to allow for the protection and conservation of intercross progeny at the level of taxonomic species, subspecies, and vertebrate populations. A second goal is to give the Services the ability to eliminate intercross progeny if their presence interferes with conservation efforts for a listed species. Alternately, it gives the Services the option to foster intercrossing where required for conservation. Because an action that would eliminate or introduce genetic material from or to a listed species must be an informed decision by experts, the Services will adopt the strongest administrative controls over such actions. Prior to implementing any action to introduce genetic material, it must be (1) recommended in an approved recovery plan, (2) supported in an approved genetics management plan (which may or may not be part of an approved recovery plan), and (3) undertaken to compensate for a loss of genetic viability in listed taxa that have been genetically isolated in the wild as a result of human activity. Further, it must be implemented in a scientifically controlled and approved manner.

This proposed rule and policy would provide several conservation benefits to species currently listed as threatened or endangered. First, it would remove the necessity for the Services to devote substantial resources to studies to determine which listed species and individuals are genetically "pure." Such studies, if required, would need to be extensive; it is not presently possible to accurately predict which species and individuals have experienced introgression and to what extent. Furthermore, even if such studies were to be carried out, the interpretation of the resultant data might be ambiguous considering the limits of current technology and incomplete understanding of the mechanisms of speciation.

Second, this proposed policy would acknowledge the Services' authority to conduct conservation programs for species that meet the listing criteria of Section 4(a)(1) of the Act, even though limited introgression may have taken place.

Third, where determined to be advantageous to recovery and where addressed in an approved recovery plan, the proposed policy acknowledges the Services' ability to use intercrossing to introduce small amounts of new genetic material from a closely related entity into a listed species that is genetically depauperate. The progeny of such an intercross, if they share characteristic traits of the listed species and more closely resemble it than an entity intermediate between the parents, would be fully protected by the Act. Such drastic steps are expected to be taken only rarely, and it is not the intent of this proposed policy to generally encourage the transfer of genetic material from one species to another.

Fourth, by generally excluding (where neither recommended in an approved recovery plan nor meeting the other tests set forth in this proposed policy) captive-propagated intercross progeny from the protection of the Act, the Services retain the ability to readily remove from the wild any such organisms that have been released or have escaped. Such releases or escapes may threaten existing or future recovery efforts by introducing genetic material into a listed species in the absence of a comprehensive evaluation of the likely impacts.

This proposed policy is not expected to affect current listing policy, nor will it result in adding species to the list. Several species suspected or known to be of hybrid origin (predominantly plants) are currently on the endangered and threatened species list (e.g., Arizona agave (*Agave arizonica*) and Mohr's Barbara's buttons (*Marshallia mohrii*)), and protection under the Act of additional species of this nature will be consistent with this proposed policy. Such species have established themselves as self-sustaining, genetically and morphologically, stable units that continue to be recognized as taxonomic species by the scientific community. The proposed policy would not affect the Services' existing treatment of these and similar species.

Except as noted in the preceding paragraph, this proposed policy would not allow the protection of the Act to be extended to a "classical hybrid," that is, an intermediate organism AB that has received half its characteristics from an unlisted parent species A and half from a listed parent species B. The offspring AB does not sufficiently resemble B to warrant protection under the Act. However, all intercross (including backcross) progeny that more closely resemble B than they resemble AB would continue to be protected by the Act (consistent with past practice).

However, where produced under conditions of captivity or confinement, such intercross progeny would be protected if the progeny was recommended in an approved recovery plan and satisfied other requirements set forth in this proposed policy.

The intentional intercrossing of species under confinement and the artificial transfer of genetic material from one taxonomic species into another (i.e., transgenics) are large and growing endeavors. This proposed policy would not include (would not protect) any individual organism resulting from these activities when they are performed under conditions that confine the progeny of the parents, even temporarily, unless the action is recommended in an approved recovery plan and satisfies other requirements set forth in this policy. The production and commercialization of hybrid organisms for the pet trade, falconry, horticulture, agriculture, and aquaculture or sport fishing purposes will not otherwise be affected by this proposed policy. Likewise, organisms resulting from genetic engineering experiments that use genetic material from listed species will not otherwise be covered by this proposed policy (although endangered species permits may be required to obtain the genetic material), unless such organisms are produced for the purpose of recovery of the listed species in accordance with an approved recovery plan. Private citizens or organizations that possess plants or animals of such origin would not normally be required to obtain additional Federal permits as a result of this proposed policy.

This proposed policy is intended to assist the Services in conserving endangered and threatened species and their unique genetic complements even if all individuals of a listed species have small amounts of genetic material from another species. However, this proposed policy is not intended to provide general support for, or preclude the establishment of, "ecologically equivalent forms" in habitats formerly occupied by threatened or endangered species. Ecologically equivalent forms are taxonomic species, subspecies, or populations that are used as replacements for extirpated or extinct species in order to maintain an apparently stable and complete plant and animal community.

Juvenile specimens of intercrosses of a listed species and an unlisted species may be indistinguishable from the unlisted species using traditional field procedures. In such a case, it would be impossible under field conditions to properly classify the juvenile stage of a possible intercross. For this reason, all

individuals that resemble a protected species should be protected until they have reached a life stage at which they can be distinguished from the listed species. The law enforcement implications of this policy are that because of similarity of appearance, taking of these individuals would be prohibited since they cannot be readily distinguished in the field from a listed species.

Public Comments Solicited

The Services intend that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited.

Regulatory Flexibility Act and Executive Order 12866

The Department of the Interior has determined that the proposed revisions to part 424 will not constitute a significant rule under Executive Order 12866 and certify that these changes will not have a significant economic effect on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*). Based on the information discussed in this proposed rule, it is not expected that significant economic impacts would result. Also, no direct costs, enforcement costs, information collection, or record keeping requirements are imposed on small entities by this proposed rule. Further, the proposed rule contains no information collection or record-keeping requirements as defined by the Paperwork Reduction Act of 1995.

National Environmental Policy Act of 1969 (NEPA)

The Services believe that this action may be categorically excluded under the Services' NEPA procedures. (See 516

DM 2 Appendix I Categorical Exclusion 1.10.) After further review, the Services will decide whether an Environmental Assessment must be prepared.

Editors: The editors of this proposal are William Kramer of the Fish and Wildlife Service's Division of Endangered Species, 452 ARLSQ, Washington, D.C. 20240 (703/358-2106); and Marta Nammack, Endangered Species Division, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, Maryland 20910 (301/713-2322).

List of Subjects in 50 CFR Part 424

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulation Promulgation

Accordingly, the Services hereby propose to amend part 424, subchapter A of chapter IV, title 50 of the Code of Federal Regulations, as set forth below:

PART 424—[AMENDED]

1. The authority citation for part 424 continues to read as follows:

Authority: Pub. L. 93-205, 87 Stat. 884; Pub. L. 95-632, 92 Stat. 3751; Pub. L. 96-159, 93 Stat. 1225; Pub. L. 97-304, 96 Stat. 1411 (16 U.S.C. 1531 *et seq.*).

2. It is proposed that § 424.02 be amended by redesignating paragraphs (f) through (n) as paragraphs (h) through (p) respectively, and adding new paragraphs (f) and (g) to read as follows:

§ 424.02. Definitions.

* * * * *

(f) *Intercross* means any mating, fertilization, or other means of exchange of genetic material between different species, subspecies, or distinct vertebrate population segments within a taxonomic species.

(g) *Intercross progeny* means any and all offspring and descendants that are the product of an intercross.

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3. It is proposed that a new § 424.03 be added to subpart A to read as follows:

§ 424.03 Intercross and intercross progeny.

(a) Unless specified otherwise and indicated by an annotation in the "Scientific name" column, any species listed as endangered or threatened pursuant to the Act will include all individuals that, considering the sum of available morphological, behavioral, ecological, biochemical, genetic, and other relevant data, more closely resemble such listed species than they resemble an intermediate between their listed and unlisted parents.

(b) Individuals that are the products of intercrosses that occurred under conditions of confinement will be excepted from the inclusion in paragraph (a) of this section unless such production is:

(1) Recommended in an approved recovery plan for a listed parent species;

(2) Supported in an approved genetics management plan (which may or may not be part of an approved recovery plan);

(3) Implemented in a scientifically controlled and approved manner; and

(4) Undertaken to compensate for a loss of genetic viability in listed taxa that have been genetically isolated in the wild as a result of human activity.

Dated: February 1, 1996.

George T. Frampton, Jr.,
Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior.

Dated: February 2, 1996.

Nancy Foster,
Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.

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