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GAO

Report to Congressional Requesters

August 2003

ENDANGERED SPECIES

Fish and Wildlife Service Uses Best Available Science to Make Listing Decisions, but Additional Guidance Needed for Critical Habitat Designations

GAO-03-803

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GAO Accountability • Integrity • Reliability

Highlights

Highlights of GAO-03-803 a report to congressional requesters

Why GAO Did This Study

Recent concerns about the U.S. Fish and Wildlife Service's (Service) endangered species listing and critical habitat decisions have focused on the role that "sound science" plays in the decision-making process—whether the Service bases its decisions on adequate scientific data and properly interprets those data. In this report, GAO assesses the extent to which (1) the Service's policies and practices ensure that listing and critical habitat decisions are based on the best available science and (2) external reviewers support the scientific data and conclusions that the Service used to make those decisions. In addition, GAO highlights the nature and extent that litigation is affecting the Service's ability to effectively manage its critical habitat program.

What GAO Recommends

Because the Service's critical habitat program faces serious challenges, including potential legal challenges and questions regarding the role of critical habitat in species conservation, GAO is recommending that the Service provide clear strategic direction for the critical habitat program, in a specified time frame, by identifying the issues affecting the Service's ability to effectively manage the program and recommending policy/guidance, regulatory, and/or legislative changes necessary to address these issues.

www.gao.gov/cgi-bin/getrpt?GAO-03-803.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Barry T. Hill at (202) 512-3841 or hillbt@gao.gov.

What GAO Found

The Endangered Species Act requires the U.S. Fish and Wildlife Service to identify, or "list," species that are at risk of extinction and provide for their protection. The act also generally requires the Service to designate critical habitat—habitat essential to a species' conservation—for each listed species. The Service must use the best available science when making listing and critical habitat decisions.

The Service's policies and practices generally ensure that listing and critical habitat decisions are based on the best available science. The Service consults with experts and considers information from federal and state agencies, academia, other stakeholders, and the general public. Decisions are subject to external "peer review" and extensive internal review to help ensure that decisions are based on the best available science and conform to contemporary scientific principles.

External reviews indicate that the Service's listing and critical habitat decisions generally have scientific support, but concerns over the adequacy of critical habitat determinations remain. Listing decisions are often characterized as straightforward, and experts, peer reviewers, and others generally support the science behind these decisions. Critical habitat designations, on the other hand, are more complex and often require additional scientific and nonscientific information. As a result, peer reviewers often expressed concern about the specific areas designated, while other experts expressed concerns about the adequacy of the data available to make designations.

The Service's critical habitat program has been characterized by frequent litigation. Specifically, the Service has lost a series of legal challenges that will require significant resources for the next 5 fiscal years to respond to court orders and settlement agreements for designating critical habitat. As a result, the Service is unable to focus resources on activities it believes provide more protection to species than designating critical habitat. While the Service recognizes that it has lost control of the program, it has yet to offer a remedy. Without taking proactive steps to clarify the role of critical habitat and how and when it should be designated, the Service will continue to have difficulty effectively managing the program.

The Canada lynx is one of more than 1,200 listed species in the United States. While scientific controversy surrounding most Service decisions to list species is rare, the Canada lynx is one example of a Service decision where there was significant scientific controversy.

Source: U.S. Fish and Wildlife Service.

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Chairman, Subcommittee on Forests and Forest Health
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The Honorable Richard Pombo
Chairman, Committee on Resources
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The Congress enacted the Endangered Species Act in 1973 to protect plant and animal species whose survival is in jeopardy. The U.S. Fish and Wildlife Service (Service) is responsible for implementing the act for freshwater and land species.[1] For many years, the act, its implementation, and the Service have served as lightning rods in the ongoing national debate concerning the tradeoffs between economic, social, and environmental values. The act requires the Service to list as endangered any species facing extinction throughout all or a significant portion of its range and to list as threatened any species likely to become endangered in the foreseeable future. The Service must make decisions to list species solely on the basis of the best available scientific and commercial data, such as biological or trade data obtained from commercial publications. The act also generally requires the Service to designate critical habitat—habitat essential to a species' conservation—when listing a species; the loss of habitat is often the principal cause of species decline. For critical habitat decisions, the act again requires the Service to consider the best available scientific data, but also requires the Service to consider the economic impact and other relevant impacts of designating particular areas as critical habitat. The Service is also required to develop a plan to recover

[1]The Department of the Interior, which has responsibilities for implementing the Endangered Species Act, has delegated its responsibility to the U.S. Fish and Wildlife Service, which established an endangered species program to implement the requirements of the act. The Department of Commerce, which has delegated its responsibilities to the National Marine Fisheries Service, is responsible for implementing the act for anadromous fish and most marine species. This report does not address the National Marine Fisheries Service program.

the listed species to the point that it is no longer threatened or endangered, an achievement marked by its removal, or delisting, from the list of threatened or endangered species.

Recent concerns about the Service's listing and critical habitat decisions have focused on the role that "sound science" plays in the decision-making process and whether the Service bases its decisions on adequate scientific data and properly interprets those data. Critics of the decisions warn that improper listing and critical habitat decisions may cause social and economic disruption and divert funding and attention away from other species truly facing extinction. In addition to concerns about its use of science, the Service is having difficulty managing the listing and critical habitat programs, in part because of extensive litigation. Currently, the Service is experiencing a significant backlog of decisions to list species and to designate critical habitat. The Service has identified more than 200 species that qualify for listing but for which the listing process has not yet begun because of resource limitations or higher-priority actions being taken for other species.

You asked us to assess the Service's consideration and use of science in its decisions to list species as threatened or endangered and to designate critical habitat. Specifically, we reviewed the extent to which (1) the Service's policies and practices ensure that listing and critical habitat decisions are based on the best available science and (2) outside reviewers support the scientific data and conclusions that the Service uses to make listing and critical habitat decisions. In addition, in performing our work, we identified certain factors that could continue to affect the Service's ability to effectively manage its critical habitat program. Our report highlights the nature and extent of those problems as well.

In meeting our objectives, we examined decision documents for the 101 listing and critical habitat decisions that the Service issued during fiscal years 1999 through 2002. There were 64 listing decisions and 37 critical habitat decisions covering 108 and 36 species, respectively. To evaluate the adequacy of the science used to support these decisions, we reviewed (1) the Service's policies, procedures, and practices for making listing and critical habitat decisions; (2) the responses of peer reviewers who commented on 79 listing and critical habitat actions; and (3) judicial decisions related to listing and critical habitat actions decided during fiscal years 1999 through 2002. We also interviewed staff at seven field and regional offices and at Service headquarters to help understand the Service's decision-making process. We interviewed individuals with

academic, industry, and conservation organizations and the National Academy of Sciences to better understand why some of the Service's decisions are controversial. In this report, we define "science" as the collection and interpretation of biological information, such as identification of the species and its habitat needs. At no point in our review did we attempt to directly evaluate the scientific analysis on which the Service based its listing and critical habitat decisions. A more detailed description of our scope and methodology is presented in appendix I.

Results in Brief

The Service's policies and practices generally ensure that listing and critical habitat decisions are based on the best available science. In making listing and critical habitat decisions, the Service consults with experts both inside and outside the federal government and considers studies or other data from federal and state agencies, other stakeholders, and the general public. Both proposed decisions and final decisions are subject to internal review at field, regional, and headquarters offices to help ensure that the professional judgment is sound and conforms to contemporary scientific theories and principles. In addition, the Service also has a policy to ask at least three independent scientific experts in a relevant field to "peer review" proposed decisions to list species or designate critical habitat to help ensure that decisions are based on the best available science.

Reviews by outside experts and others indicate that the Service's listing and critical habitat decisions are generally based on the best available science, but that there are concerns over the adequacy of the data used to support critical habitat designations. For listing decisions, peer reviewers overwhelmingly supported the science behind the decisions the Service issued between fiscal years 1999 and 2002. Additionally, during that same time period, the courts overturned few listing decisions because the Service relied on faulty or inadequate science. Further evidence that listing decisions are scientifically sound is provided by the fact that only 10 of the more than 1,200 domestic listed species have been delisted after new scientific information surfaced that indicated the original listing was not warranted. In contrast, while external reviews indicate that most critical habitat decisions are based on the best available science, experts and others we spoke to expressed concerns over the adequacy of the information available to support the designations. While peer reviewers generally agreed with the science supporting the Service's critical habitat decisions, they often also provided suggestions for modifying the designations. In three decisions, peer reviewers disagreed with the Service's designation of critical habitat, stating that the Service had

insufficient information to make the decision. Although the Service has frequently lost legal challenges over its critical habitat designations, courts have overturned few of the Service's critical habitat decisions as not supported by the best available science. Instead, most of the challenges dealt with nonscience issues, such as the Service's failure to designate habitat for a listed species.

Key court decisions have invalidated certain practices adopted by the Service, causing its critical habitat program to be dominated by litigation. In 1997, the Service lost a lawsuit challenging its practice of not designating critical habitat for many species; the Service did not designate critical habitat because it believes it conveys little additional protection to listed species. This suit led to numerous other suits, resulting in court orders directing the Service to designate critical habitat for many previously listed species. In 1999, the Service announced that its system for designating critical habitat was not working and that critical habitat litigation and related court orders were consuming much of the program's resources. To remedy the situation, the Service announced its intention to develop guidance and/or regulations to clarify the role of critical habitat in endangered species conservation and to streamline the process used to designate critical habitat. However, such guidance and clarification were never issued, and the Service continues to follow the same system that it recognizes is unworkable. In 2001, the Service lost another lawsuit, which challenged the adequacy of the economic analyses the Service used to support its critical habitat designations. These two lawsuits, and subsequent legal challenges based on similar issues, have come to dominate the Service's critical habitat program. In 2002, we reported on problems facing the critical habitat program and recommended that the Service expedite its efforts to issue guidance for the program; however, the Service has yet to do so.[2] If the Service does not take proactive steps to clarify the role of critical habitat and how and when it should be designated, we believe it will continue to have difficulty effectively managing the program. Therefore, we recommend that the Service—through guidance, regulations, or other policy tools—provide clear strategic direction for the critical habitat program in order to provide the greatest conservation benefit to threatened and endangered species in the

[2]U.S. General Accounting Office, *Endangered Species Program: Information on How Funds Are Allocated and What Activities Are Emphasized*, GAO-02-581 (Washington, D.C.: June 25, 2002).

most cost-effective manner. The Department of the Interior did not respond to our request to comment on the recommendation.

Background

The Congress enacted the Endangered Species Act in 1973 to conserve threatened or endangered plant and animal species. The act requires the Service to base its determination of whether a species is endangered or threatened solely on the basis of the best available scientific and commercial data.[3] Available data includes biological or trade data obtained from scientific or commercial publications, administrative reports, maps or other graphic materials, or experts on the subject. Using the best available data, the act requires the Service to determine whether a species should be listed as threatened or endangered by analyzing its status based on the following five factors:[4]

- present or threatened destruction, modification, or curtailment of a species habitat or range;
- overuse for commercial, recreational, scientific, or educational purposes;
- disease or predation;
- inadequacy of existing regulatory mechanisms; or
- other natural or manmade factors affecting a species' continued existence.

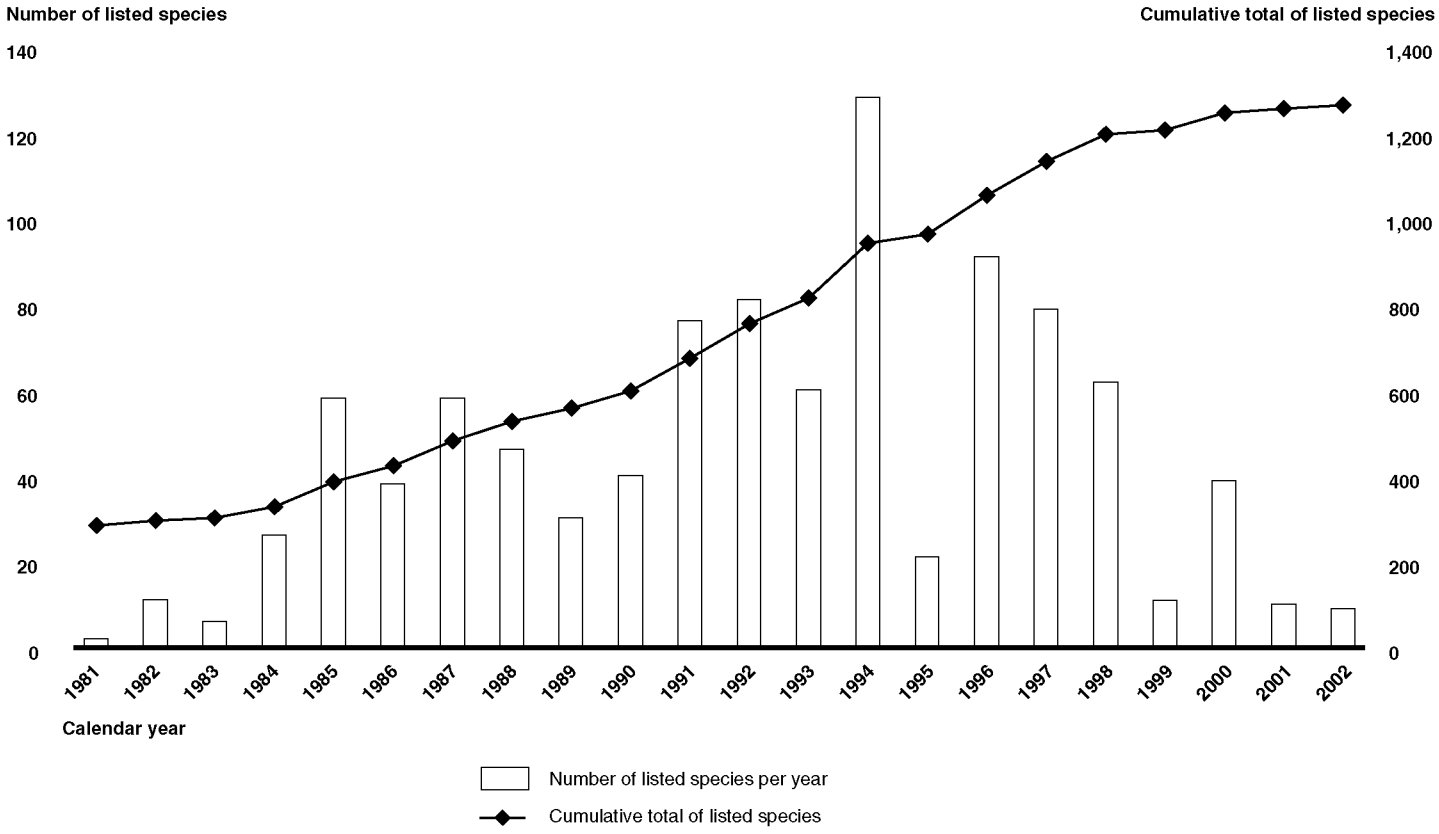
[3]16 U.S.C. §1533(b).

[4]16 U.S.C. §1533(a)(1). The Service must also use these factors to determine if a species should be reclassified from endangered to threatened or vice versa and, in some instances, whether it should be delisted. The Service would not take into consideration these factors to delist a species because it is extinct.

As of June 2003, the Service had listed 1,263 species in the United States as threatened or endangered. This total included 517 animal species and 746 plant species.[5] The number of species listed per year has varied considerably, as shown in figure 1. There are also 558 foreign species listed as threatened or endangered.

[5]The totals count a species or subspecies only one time, even if it occurs on the list more than once. A species or subspecies could be listed more than once if, for example, it was threatened in one part of its range and endangered in the rest of its range (these are known as "dual status species"). Similarly, a species or subspecies might occur on the list more than once if more than one distinct population segment of a species is listed. Distinct population segments are populations of vertebrate species that are discrete, for example, because they are geographically separated from other populations of the species.

Figure 1: Number of Domestic Species Listed as Threatened or Endangered, 1981 through 2002

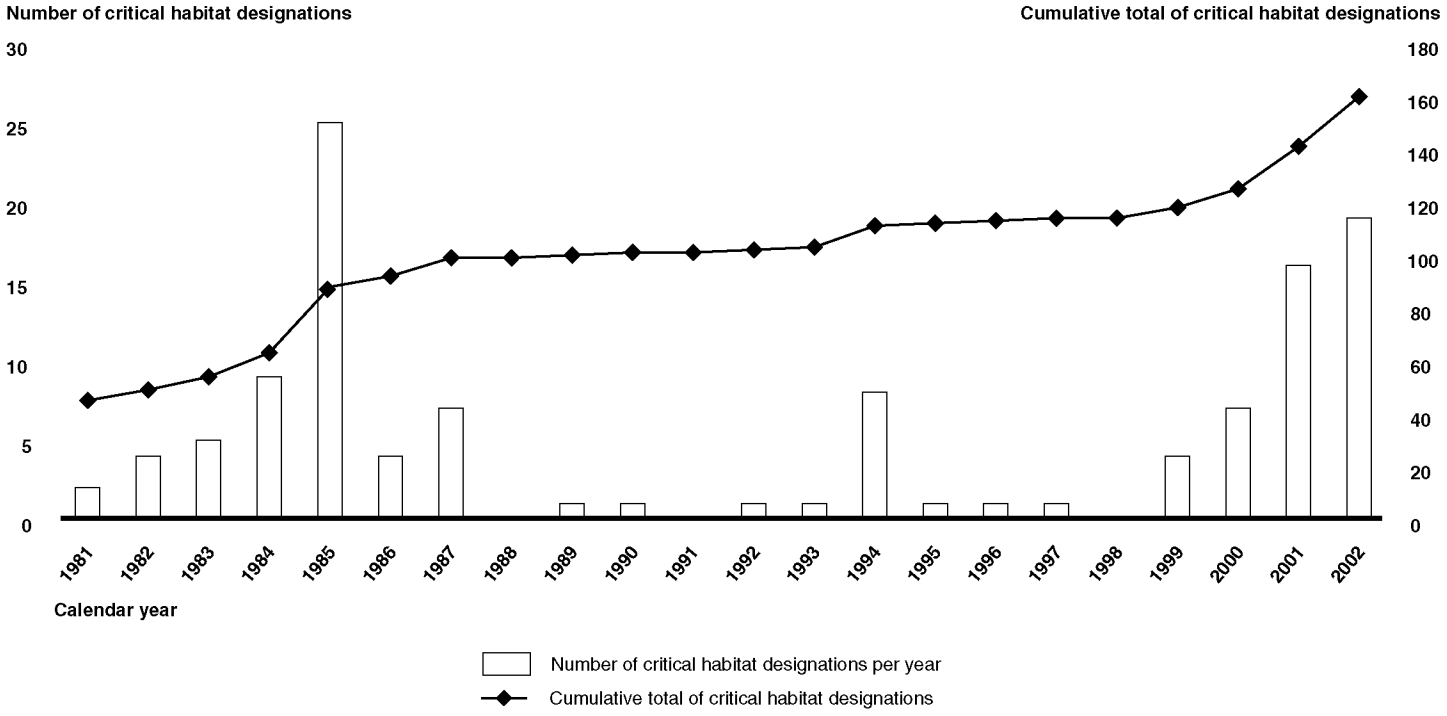


Source: GAO analysis of U.S. Fish and Wildlife Service data.

Note: There have been 25 domestic species delisted since the inception of the act. These species are not included in the figure. In addition, 16 species have been reclassified from endangered to threatened.

As of June 2003, the Service was in the process of listing 36 more species and had identified 251 species as candidates for listing. The act also requires the Service to designate critical habitat for listed species. Critical habitat is a specific geographic area that is essential for the conservation of a threatened or endangered species and that may require special management and protection.[6] As of June 2003, 417 domestic species had critical habitat designated. The number of critical habitat designations per year has varied considerably, as shown in figure 2.

Figure 2: Number of Domestic Species with Critical Habitat, 1981 through 2002



Source: GAO analysis of U.S. Fish and Wildlife Service data.

Note: Some species may have had critical habitat designated more than one time; the graph includes only the first time that critical habitat was designated.

[6]16 U.S.C §1532(5).

The Endangered Species Act has provisions to protect and recover species once they are listed. The act prohibits the "taking" of listed animal species by any party—federal or nonfederal.[7] "Taking" or "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species.[8] Also, federal agencies must ensure that their activities, or any activities they fund, permit, or license, do not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of its critical habitat. The act establishes a process for federal agencies to consult with the Service about their activities that may affect listed species. In addition, the act requires that the Service develop a recovery plan to reverse the decline of each listed species and ensure its long-term survival. A recovery plan may include a variety of methods and procedures to recover listed species, such as protective measures to prevent extinction or further decline, habitat acquisition and restoration, and other on-the-ground activities for managing and monitoring endangered and threatened species. To date, seven domestic species have been delisted due to recovery. (App. II provides additional information on the process used by the Service to protect listed species.)

Procedures Are in Place to Ensure That Listing and Critical Habitat Decisions Are Based on the Best Available Science

The Endangered Species Act requires the Service to use the best available scientific data when deciding to list species or designate critical habitat. The "best available" standard does not obligate the Service to conduct studies to obtain missing data, but it prohibits the Service from ignoring available data. The Service goes through an extensive series of procedural steps that involves public participation and review by outside experts to help ensure that it collects relevant data and uses it appropriately. Although the process alone is not sufficient to ensure the accuracy of the Service's listing and critical habitat decisions, it generally ensures that the Service is using and considering the "best available" data.

[7]16 U.S.C. §1538(a)(1)(B), (C). The Endangered Species Act prohibits the taking of endangered, but not threatened, species. However, the act authorizes the Service to, by regulation, prohibit the taking of a threatened species. The Service has issued a regulation extending the take prohibitions to threatened species, except for those covered by a specific rule, exemption, or permit. *See* 50 C.F.R. §17.31.

[8]16 U.S.C. §1532(19).

Internal Decision-Making Process Helps Ensure That the Service Uses Best Available Science in Making Decisions

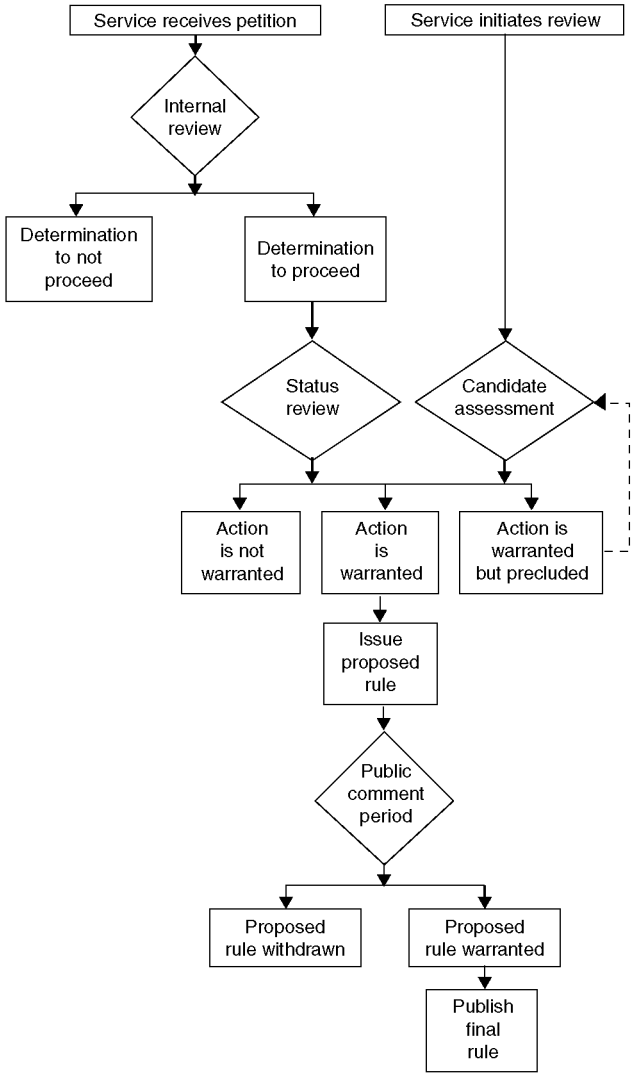
The Service follows a rigorous process in listing a species as endangered or threatened, designating critical habitat, or removing a species from the endangered and threatened list. The Service's process includes following a rulemaking procedure, established by the Endangered Species Act, supported by additional procedures under Service regulations and guidance. The complete text of the proposed and final rules and related information (including a summary of data on which the proposal is based and a summary of comments received on the proposal) are published in the *Federal Register*, the government's official publication for making public the regulations and legal notices issued by federal agencies. The act and regulations require the Service to provide an opportunity for public participation in the rulemaking process, notify affected states and local jurisdictions and invite comments from them and other interested parties, notify newspapers and professional journals, and hold at least one public hearing, if requested, within 45 days of publishing the proposal. Additionally, Service procedures provide for listing and critical habitat decisions to be reviewed internally to help ensure that the professional judgment that the Service's scientists exercise when weighing and interpreting the collected data is sound and conforms to contemporary scientific theories and principles.[9]

The process to list a species begins either through a petition from an individual, group, or state agency or through the initiative of the Service (see fig. 3).[10]

[9]The Department of the Interior has recently issued a code of scientific conduct to be used by all Interior scientists—including the Service—to ensure that all research and analysis is conducted according to the highest standards of the scientific community.

[10]The Service uses the same process to delist or to reclassify a species from endangered to threatened or vice versa. Either action may be initiated through a petition or by the Secretary of the Interior.

Figure 3: The Service's Process to List Species as Threatened or Endangered



Source: GAO analysis of U.S. Fish and Wildlife Service data.

When a petition is filed to list a species, the Service provides a copy of the petition to, and requests information from, appropriate state agencies and affected tribal governments. The Service uses the information that it receives from these parties (or that which is contained in the petition or otherwise readily available) to make its initial determination as to whether a species may be threatened or endangered, and if so, to proceed with data gathering and analysis.[11] The act requires the Service to make this determination generally within 90 days of receiving the petition. If the Service determines that it should proceed, it conducts a "status review"—a review of all the available information on a species—to determine whether the species warrants protection under the act. To conduct the status review, the Service solicits comments and requests information from the general public (by publishing a notice in the *Federal Register*) and contacts affected local, state, tribal and federal agencies; interested conservation or industry groups; and scientific organizations or professionals interested in and/or knowledgeable about the species. The Service may also fund field surveys, museum research, and literature searches in order to compile available information. Service scientists who conduct status reviews told us that they often work closely with experts from other government agencies, academia, and elsewhere to help gather and interpret information. In some instances, the Service initiates a review of a species without a petition, for which it conducts a candidate assessment—similar to a status review—to identify available information.

Within 12 months of receiving a petition for which the Service proceeded with a status review, the Service must determine whether the species' listing is warranted. If a Service field office makes an initial determination that the listing is warranted, it prepares a proposed rule for publication in the *Federal Register*. Before the proposed rule is published, a draft receives considerable internal review by officials in the Service's field, regional, and headquarters offices.[12] The review by officials in the field and

[11]The Service bases its determination on whether or not there is "substantial" information to proceed. Substantial information is defined by Service regulations as information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted. 50 C.F.R. § 424.13(b).

[12]If the field office determines the petition is not warranted or is warranted but precluded, the Service will issue a notice in the *Federal Register*. This notice goes through a similar internal review process. A "warranted but precluded" finding is made when the petitioned action is precluded from immediate action by other, higher priority actions. The Service reevaluates warranted but precluded petitions every 12 months until either a proposed rule is issued or a "not warranted" finding is made.

regional offices helps ensure the exercise of sound professional judgment. The field office that is responsible for the listing provides the appropriate regional office with the draft of the proposed rule and all supporting scientific information. Officials in the regional office review the proposed rule to ensure that scientific information supports the proposed rule. Regions are responsible for ensuring that the proposed rule is scientifically accurate and biologically and legally sound. Regional officials told us that the review is an opportunity for the region to identify information gaps and issues concerning how the information supports the conclusions. At the Service's headquarters, the draft proposed rule is reviewed to ensure that it is consistent with other listing rules and complies with national policies. Either the Director of the Fish and Wildlife Service or the Assistant Secretary for Fish and Wildlife and Parks approves all proposed rules before publication.

Upon publication, the public has at least 60 days to provide comments on a proposed rule. The Service may extend the public comment period and/or reopen it at a later date. Service officials told us that the public comment period is an opportunity to reach biologists, scientists, academicians, and advocacy groups that the Service may not have contacted previously. The Service also holds public hearings, if requested. At the end of the public comment period, the Service reevaluates all the data, including the comments received since the proposal was published, to determine whether the listing is still warranted. If not, the proposal will be withdrawn. The Service must publish its final decision within 12 months of its proposal. In cases when experts disagree on the accuracy or sufficiency of the available data concerning the proposed listing, or the release of additional information that may affect the outcome of the petition is expected, the proposal may be extended 6 months beyond the normal 12-month time frame. In the event that the listing is warranted, the Service prepares a final rule, incorporating appropriate changes based on the information received during the comment period. Final rules are subject to the same internal review process as proposed rules and are approved by either the Director of the Fish and Wildlife Service or Assistant Secretary for Fish and Wildlife and Parks before being published.

The procedures for designating critical habitat are similar to those for listing a species. However, in designating critical habitat, the Service must also take into consideration the economic and other impacts of specifying any particular area as critical habitat. The Assistant Secretary of Fish and Wildlife and Parks approves critical habitat designations.

Officials at all levels of the agency demonstrated familiarity with the requirements of the review process and stated that they believe it provides the general guidelines necessary to ensure the best available data are identified and properly interpreted. Field office officials noted that proposed and final rules are challenged internally to ensure they can withstand public scrutiny and that while rulemakings are initiated at the field level, extensive review ensures that the entire agency is on board before anything is finalized. Scientists and other agency personnel told us that they use the process to test the validity of their listing and critical habitat decisions. Some officials emphasized the crucial role that the experience and expertise of the Service's scientists play in ensuring that listing and critical habitat decisions are based on the best available science.

Outside Experts Review Proposed Rules

Peer review is considered to be the most reliable tool to ensure that quality science will prevail over social, economic, and political considerations in the development of a particular product or decision. Peer review—a routine component of science—can substantially enhance the quality and credibility of the scientific or technical basis for a decision. For regulatory decisions, peer review can provide for independent and expert analysis to complement the adversarial and political nature of rulemaking.

While many federal agencies were already using peer review, the Office of Management and Budget (OMB) issued guidance in 2002 recommending that federal agencies utilize formal, independent external peer review (peer review by individuals outside of the agency) to ensure the quality of data and analytic results disseminated to the public.[13] It also recommended that peer reviewers be selected primarily on the basis of their technical expertise, that they disclose any source of bias (either prior technical or policy positions or sources of personal and institutional funding from which they may benefit), and that peer review be conducted in an open and rigorous manner. [14]

[13]67 *Fed. Reg.* 8452 (Feb. 22, 2002).

[14]Office of Management and Budget, *Memorandum for the President's Management Council*, Sept. 20, 2001.

Federal agencies have adopted a variety of peer-review practices, depending on the nature of the product or decision under review. As we reported in 1999, peer-review practices at federal agencies vary according to their intended use and form.[15] According to OMB's 2002 guidance, agencies should tailor the rigor and intensity of peer review in accordance with the significance of risk or management implications of the information involved. The form of peer review can range from informal consultations with agency colleagues not involved in the earlier stages of the project to formal external advisory panels, which can span several years and cost thousands of dollars. In addition, for each different form of peer review, there are multiple variations—the amount of time allocated for the review, the number of reviewers, and whether the review occurs internally or externally—all of which affect the overall time and cost required to conduct a review.

In addition to its internal decision-making processes, the Service uses external peer review of listing and critical habitat decisions to ensure that the best biological and commercial information is being considered. The Service's peer-review policy requires officials to solicit the opinions of three appropriate and independent experts regarding scientific data and assumptions supporting listing and critical habitat decisions.[16] Peer reviewers are selected at the discretion of the field office scientists responsible for developing listing and critical habitat decisions. The reviewers, who may come from the academic and scientific community, tribal and other Native American groups, federal and state agencies, and/or the private sector, are selected on the basis of their independence and expertise on the species being considered, similar species, the species' habitat, or other relevant subject matter. The Service's scientists may ask peer reviewers to critique specific aspects of the proposed rule, such as the Service's interpretation of a particular study, or they may ask reviewers to comment on the rule in its entirety.

The Service's peer-review policy generally appears to be appropriate for the circumstances in which it is used. Although other agencies may use more rigorous forms of peer review, such as convening a peer-review panel or a

[15]U.S. General Accounting Office, *Federal Research: Peer Review Practices at Federal Science Agencies Vary*, GAO/RCED-99-99 (Washington, D.C.: Mar. 17, 1999).

[16]59 *Fed. Reg.* 34270 (July 1, 1994). The Service is currently drafting interim peer review guidance that will provide objectives and procedures for implementing the 1994 peer review policy. It does not have an estimated date when it will issue permanent guidance.

science advisory board, the Service's peer-review process allows the Service to make listing and critical habitat decisions under relatively short time frames (the Service usually asks peer reviewers to perform their review during the public comment period—normally 60 days—while a peer-review panel may span several months or years). However, to help ensure the identification of complete and current information on a species and its habitat, the Service may contact experts during the status review. In addition, any decisions that are issued as "final" rules can later be reconsidered as circumstances warrant or new information becomes available. In fact, a species can be delisted if new information surfaces indicating that the original decision to list was not warranted.

One limitation that the Service faces in getting an independent review is the scarcity of experts on a particular species. For example, in some instances, the most qualified experts to peer review a decision may have authored some of the studies that the Service used to support its decision, forcing the Service to balance expertise with independence. However, according to a National Academy of Sciences report that reviewed the Environmental Protection Agency's use of peer review for similar actions, to choose an individual to peer review who is both an expert and independent might be impossible, or might not promote the best possible review.[17] In such cases, an appropriate balance of views may be sought to ensure that different interpretations on the scientific and technical merit of a decision are taken into consideration. Such cases should, however, be fully disclosed. Other organizations have developed procedures for assessing the independence of peer reviewers, ranging from simply requiring peer reviewers to disclose any potential bias, to using third parties to identify peer reviewers based, in part, on their independence. Service officials told us that they have not adopted a formal procedure to assess peer reviewers' independence, and the Service does not publicly disclose in the *Federal Register* potential conflicts or prior involvement by its peer reviewers when the Service publishes the final rule.

[17]National Research Council, *Strengthening Science at the U.S. Environmental Protection Agency: Research-Management and Peer-Review Practices* (Washington D.C.: National Academy Press, 2000).

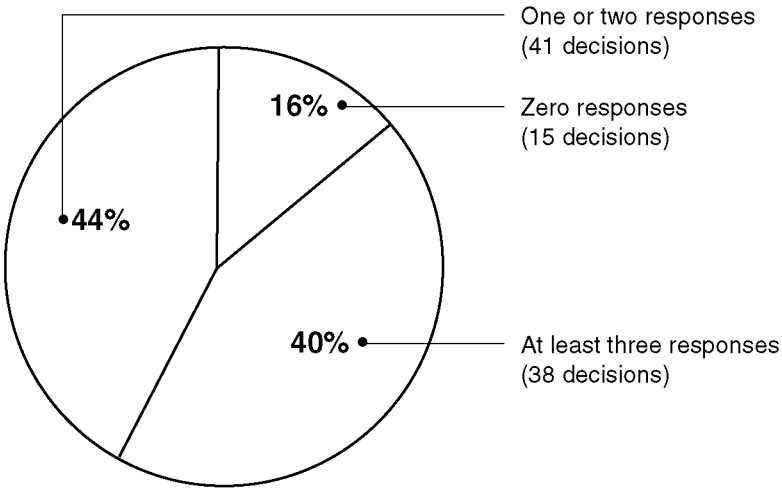
The Service generally complied with its peer-review policy of soliciting peer review from at least three reviewers during fiscal years 1999 through 2002. During this time, the Service solicited three or more peer reviewers in 94 out of the 100 listing and critical habitat decisions it made.[18] In three instances the Service solicited fewer than three peer reviewers, and in three other instances documentation was unavailable to indicate how many reviewers were asked.[19] (See app. III for a complete list of the decisions with the number of peer reviewers solicited, the number that responded, and how they responded.)

While the Service generally complied with its policy to seek peer reviewers, reviewers often did not respond. As shown in figure 4, the Service received responses from three or more peer reviewers in 38 decisions for which it solicited at least three peer reviewers. It received either one or two responses in 41 decisions, and no responses in 15 decisions.

[18]Although the Service published 101 listing and critical habitat decisions during fiscal years 1999 through 2002, the decision to list as threatened the Lake Erie water snakes (64 *Fed. Reg.* 47126 (Aug. 30, 1999)) is not included in this analysis because the comment period for the proposed rule opened before the Service's peer review policy became effective.

[19] In two additional instances, documentation is also unavailable to indicate how many reviewers were asked but there is documentation that the number of respondents was greater than two. In these instances, we credited the Service with having solicited at least three peer reviewers.

Figure 4: Peer Review Response Rates for Listing and Critical Habitat Decisions, Fiscal Years 1999 through 2002



Source: GAO analysis of U.S. Fish and Wildlife Service data.

Note: Response rates are for the 94 decisions for which the Service solicited at least 3 peer reviewers. Overall, the Service asked 422 experts to peer review the 100 listing and critical habitat decisions made during fiscal years 1999 through 2002 and received 212 responses (50 percent response rate).

Field office scientists, as well as an expert on peer review, reported a variety of reasons for the limited number of responses, including (1) the potential peer reviewers had busy schedules and felt constrained by the short time frames allotted to conduct the review, and (2) the potential reviewers were unwilling to conduct peer review either because they did not want to become involved in a controversial decision or because they did not want to work without compensation. In addition, the field office scientists reported that potential peer reviewers may not be inclined to conduct peer review because they found nothing to criticize or had already provided comments at an earlier stage of the decision, such as during the status review.

Recognizing the importance of peer review, some regional and field offices have taken steps to increase the number of respondents. For example, some field offices contact potential peer reviewers in advance, rather than initiating contact just before the decision is open for peer review; others maintain communication with the peer reviewers throughout the process. For example, the Pacific Islands field office in Honolulu, Hawaii, has assigned an administrative staff person to initiate phone calls and E-mails to help remind and encourage peer reviewers to respond. This staff person

also monitors the implementation of the peer-review policy and tracks results. In order to increase the likelihood that at least three peer reviewers respond to a request, some field offices request peer reviews from more than three individuals. Field office scientists suggested other ways to increase the response rate, such as providing monetary compensation, using a third party to select and coordinate peer review, narrowing the scope of the review, and providing more time for review.

Peer Reviewers and Others Conclude that Most Listing Decisions Are Based on Best Available Science, but Concerns about Critical Habitat Decisions Remain

External reviews of listing and critical habitat decisions indicate that most decisions are generally scientifically supported, but concerns about the adequacy of critical habitat determinations remain. Listing decisions are often characterized as straightforward, requiring the Service to answer only a "yes or no" question as to whether a species warrants inclusion on the threatened or endangered list. Critical habitat designations, on the other hand, are more complex and often require further information on the species' habitat requirements and other management considerations. Peer reviewers often expressed concerns about the specific areas designated as critical habitat, while other experts expressed concerns about the adequacy of the information available to make the designation.

Little Scientific Disagreement Surrounds Listing Decisions

Experts and others have found most of the Service's listing decisions to be scientifically supported. Experts knowledgeable about the Endangered Species Act and recent studies assessing the Service's use of science in making listing decisions concur that the Service's listing decisions are generally supported. Similarly, experts not affiliated with the Service have peer-reviewed proposals to list species and overwhelmingly supported the Service's decisions. The courts have overturned few listing decisions on the basis of inadequate science, and the Service has delisted few species on the basis of new information that suggested that protection under the act was not originally warranted.

Experts and Others Generally Support Service Listing Decisions

Experts, Service officials, and others knowledgeable about the Endangered Species Act largely agree that most listing decisions have been relatively straightforward and scientifically supported. Experts and others we spoke to generally agreed that most listed species probably deserved being listed under the current standard for best available scientific information. For example, several attorneys, who represent the regulated community in challenges to the Service's decisions, stated that, given the Service's short time frames and limited resources, the science used to support most listing

decisions did not present a significant problem. However, these attorneys and others contend that the "best available data" standard does not provide enough certainty that a species is threatened or endangered and suggest that a more stringent standard should be developed. On the other hand, interested parties representing a diverse set of interests raised concerns that Service officials at the Headquarters level are succumbing to political pressures to not list species despite support from regional and field scientists who believe evidence shows that listing is warranted. Service scientists told us they believe many listed species have low populations and/or face clearly identified threats, indicating that the species are at risk. They said that many listing decisions have been made to protect species native to a specific area, with a narrow range, or for which substantial scientific information was already available or easy to collect. On the other hand, the scientists noted that collecting information becomes more difficult and costly when a wide-ranging species may be at risk. Additionally, several scientific disagreements regarding listing decisions have surfaced in recent years, mostly concerning whether the amount of information available at the time a decision is made suffices as a basis for a decision. (See app. IV for information on the nature of scientific controversy surrounding the Service's decisions to list species.) Finally, many of the experts we spoke with had concerns about the science used to support other aspects of the act, such as recovery actions or consultations with federal entities on proposed actions that could potentially harm a listed species.

Several studies have supported the Service's use of science in making listing decisions. The Ecological Society of America—a professional society of ecologists representing ecological researchers in more than 60 countries—released a study on the use of science in achieving the goals of the act that concluded that the major problem with the listing process has been its slowness rather than the quality of the listing decisions.[20] The National Research Council (NRC) reached similar conclusions in a 1995 report, finding that many of the conflicts and disagreements over the Endangered Species Act do not appear to be based on scientific issues.[21] More recently, in 2002, NRC reviewed the genetic evidence used to support one particular listing decision, the listing of the Gulf of Maine Atlantic salmon distinct population segment.[22] It concluded that Maine salmon are genetically distinct from other salmon, supporting the Service's decision to list the species.

Peer Reviewers Overwhelmingly Support the Service's Use of Science in Making Listing Decisions

The Service received 143 peer-review responses for 54 of the 63 listing decisions finalized between fiscal years 1999 and 2002 and no responses for the remaining 9 decisions (see app. III). In 48 of these decisions, reviewers providing comments unanimously agreed with the Service's scientific conclusions or otherwise indicated support for the decision to list the species. In two decisions, the Service reported that one of the peer reviewer's opinions was "neutral," and the rest of the opinions were supportive. In two other decisions, we were unable to determine the nature of one of the peer reviewer's response. Peer reviewers disagreed with the Service in the following two decisions:

- *Alabama sturgeon.* One of the five reviewers to provide comments on the proposal to list the Alabama sturgeon, a freshwater fish historically found throughout the Mobile River basin of Alabama and Mississippi, disagreed with the Service's proposed listing determination. While the reviewer did not directly respond to the Service's request for peer review, he did provide comments at one of the public hearings regarding

[20]Carroll, R., et al., Strengthening the Use of Science in Achieving the Goals of the Endangered Species Act: An Assessment by the Ecological Society of America. Ecological Applications, 6(1): 1-11 (1996).

[21]National Research Council, *Science and the Endangered Species Act* (Washington D.C.: National Academy Press, 1995) 202.

[22]National Research Council, *Genetic Status of Atlantic Salmon in Maine: Interim Report from the Committee on Atlantic Salmon in Maine* (Washington D.C.: National Academy Press, 2002).

the proposed rule. The reviewer argued that the Alabama sturgeon was not a valid species given the fish's morphological (i.e., physical appearance such as color pattern, shape, and scale patterns) and genetic evidence. The other four reviewers responding to the proposed rule supported the validity of the Alabama sturgeon as a species.

- *Desert yellowhead.* One of two reviewers who provided comments on the proposed rule to list the desert yellowhead (a flowering plant that occurs in Wyoming) agreed that the species was rare and in need of protection, but did not agree that listing the species under the act was the appropriate mechanism. The other reviewer supported listing the plant.

Courts Have Overturned Few Listing Decisions on the Basis of Inadequate Science

The Service's actions and inactions under the act are frequently challenged in the courts. In hearing such challenges, courts must defer to agencies in judging actions, such as listing decisions, and must not substitute their judgment for an agency's, especially on technical matters.[23] As a result, courts will uphold an agency decision when it is evident that the agency considered the relevant facts and articulated a rational connection between those facts and its decision.[24] Partly because of the deference granted to the Service in making listing determinations, most litigation has not directly challenged the Service's use of science. Instead, according to an official from the Department of the Interior's Office of the Solicitor, most litigation revolves around definitional or procedural issues, such as the Service's failure to meet statutory time frames. The official said that litigants often challenge decisions on nonscientific aspects of the act because they feel this provides them with a stronger case. Thus, the fact that the courts have rarely ruled against the Service on the basis of inadequate science is not necessarily an affirmation that the Service used the best available science.

Based on a review of federal court cases decided during fiscal years 1999 through 2002, we identified 17 cases in which a court issued an opinion related to the Service's listing decisions. The Service lost 11 of these cases, mostly because it failed to take certain actions regarding decisions to list or not to list a species within the time allotted by the act. However, the courts

[23]*Baltimore Gas and Electric Co. v. Natural Resources Defense Council*, 462 U.S. 87, 103 (1983); *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976).

[24]*Baltimore Gas and Electric Co.*, 462 U.S. at 105.

overturned listing decisions on the basis of issues related to the use of scientific data in the following two cases:

- *Sacramento splittail.* In 2000, a federal court ruled that the decision to list the Sacramento splittail was not supported by the best scientific data available.[25] The splittail is a large fish with a distinctive tail and is native to California's Central Valley. Regional water authorities challenged the listing of the splittail on scientific grounds, asserting, among other things, that the Service ignored an important study indicating resiliency and an increasing abundance of the splittail. The court rejected the Service's arguments that these data were not submitted in time to be considered and were irrelevant, and found there to be no indication that the Service considered substantial evidence that suggested that the splittail should not be listed. The court thus concluded that the Service had failed to consider all available data. The Service is in the process of reevaluating this listing rule.

- *Westslope cutthroat trout.* In 2002, a federal court ruled that the Service's decision not to list the Westslope cutthroat trout was not supported by the best scientific data available.[26] The Westslope trout is one of 14 subspecies of cutthroat trout native to streams in the western United States. In its decision not to list the trout, the Service identified hybridization (the breeding with other species of trout) as one of the threats to the species, but included these hybrid fish in the population considered for listing. The court noted that if hybridization were a "threat" to the species, it would seem logical that hybrid fish should not be included in the population under consideration. After explaining that the identification of the existing population of the trout was vital to the ultimate listing determination, the court found that the record failed to offer a rationale for including hybrid stocks in the population that it considered for listing, and concluded that the Service had ignored existing scientific data for assessing the degree of hybridization that may be appropriate to include in the population. The court remanded the case to the Service for reconsideration.

[25]*San Luis v. Badgley*, 136 F. Supp.2d 1136 (E.D.Cal. 2000).

[26]*American Wildlands v. Norton*, 193 F.Supp.2d 244 (D.D.C. 2002).

The Service lost the following two cases because it failed to assess whether the species was imperiled throughout "a significant portion of its range."[27]

- *Flat-tailed horned lizard*. In 2001, an environmental group successfully challenged the Service's decision not to list the flat-tailed horned lizard, a small lizard found in desert lands in the southwestern United States.[28] In reaching its decision, the Service concluded that regardless of the threats to the lizard on private lands, large populations of the lizard and areas of its habitat were already protected under a conservation agreement on public lands and that the species was sufficiently protected from further threats. The court found that the Service should have performed an analysis to determine whether the private lands constituted "a significant portion of [the lizard's] range" and, if so, whether the lizard was or would become extinct in that area. The court remanded the case to the Service for those determinations.

- *Queen Charlotte goshawk*. In 2002, an environmental group successfully challenged the Service's decision not to list the Queen Charlotte goshawk, a forest-dwelling bird of prey found throughout North America.[29] In reaching its decision, the Service considered the goshawk's presence in southeast Alaska, the Queen Charlotte Islands, and Vancouver Island in Canada.[30] The Service found that the goshawk was not threatened or endangered in southeast Alaska or the Queen Charlotte Islands, but the Service did not make a determination regarding the goshawk's status on Vancouver Island. The Service contended that the goshawk's status on Vancouver Island did not matter because that area did not represent a significant portion of the goshawk's range. The decision in this case upheld the Service's determination regarding southeast Alaska and the Queen Charlotte Islands, finding that the Service had properly used the best available

[27]The Endangered Species Act defines an endangered species and a threatened species as a species that is endangered or threatened throughout all "or a significant portion" of its range. 16 U.S.C. §1532(6), (20). In fiscal year 2003, the Service lost another listing case on similar grounds. *See Defenders of Wildlife v. Norton*, 239 F.Supp.2d 9 (D.D.C. 2002).

[28]*Defenders of Wildlife v. Norton*, 258 F.3d 1136 (9th Cir. 2001).

[29]*Southwest Center for Biological Diversity v. Norton*, 2002 WL 1733618, No. 98-934 (D.D.C. 2002).

[30]The range to be considered is not limited to areas within the United States. *Defenders of Wildlife v. Norton*, 258 F.3d at 1145.

science. However, the decision went on to conclude that Vancouver Island represented a significant portion of the goshawk's range and that the case should be remanded to the Service to determine whether the goshawk was threatened or endangered on Vancouver Island.

The Service Has Delisted Few Species on the Basis of New Scientific Information Showing That Listing Was Not Warranted

In addition to removing recovered or extinct species from the list of threatened or endangered species, the Service can also delist a species if new information becomes available to show that protection under the act is not warranted. Typically, listing a species generates widespread attention to the species, additional funding for its study, and further research relating to the species or its habitat. As additional information is gathered, the Service or interested parties can initiate a delisting action if they believe the species no longer qualifies for listing. The Service follows similar rulemaking procedures to delist a species as for listing.

Since the inception of the Endangered Species Act, the Service has delisted few species. As of March 2003, the Service had delisted 25 threatened and endangered domestic species of the more than 1,200 listed.[31] Of the 25 delistings, 10 resulted from new information—4 because new information showed the species to be more widespread or abundant than believed at the time the species was listed, and 6 for taxonomic revisions, meaning that the species was found not to be unique, but was a hybrid or simply a population of another common species making it ineligible for listing (see table 1). The remaining 15 delistings resulted from recovery efforts (7), extinction (7), or an amendment to the act that made the species no longer qualify for listing protection (1).[32]

[31]An additional 8 foreign species have been delisted, 7 due to recovery and 1 due to erroneous data.

[32]Amendments to the act in 1978 restricted protection for distinct population segments to vertebrates. The species listed was the Florida population of the Bahama swallowtail butterfly, and thus the act, as amended, required that the species be removed from the endangered species list. See 49 *Fed. Reg.* 34501 (Aug. 31, 1984).

Table 1: Species Delisted on the Basis of New Information

Species name	Description	Date listed	Date delisted	Reason delisted
				Species more abundant or widespread
Dismal Swamp southeastern shrew	A small, long-tailed shrew found in the southeastern U.S.	Sept. 26, 1986	Feb. 28, 2000	Analyses completed after the species was listed showed that the species is actually widely distributed and uses a wide variety of habitat types.
McKittrick pennyroyal	A small herb native to the Guadalupe Mountains in southeastern New Mexico and northwestern Texas	July 13, 1982	Sept. 22, 1993	Since the time of listing, additional surveys have shown the plant to be more widespread and abundant than previously known. Further, management actions were taken by various federal agencies to provide protections to the plant.
Tumamoc globeberry	A vine occurring in south-central Arizona and extending southward into Mexico	Apr. 29, 1986	June 18, 1993	Surveys and studies completed after the time of the listing showed that the range of the species is much larger than originally known and the plant was more common and requires less habitat-specific areas than was believed at the time of listing.
Pine barrens treefrog, Florida population	A frog known to occur in Florida, Alabama, New Jersey, and the Carolinas	Nov. 11, 1977	Nov. 22, 1983	Subsequent studies completed after the time of listing revealed a number of new populations and a more extensive distribution of the species throughout Florida and Alabama.
				Taxonomic revision
Umpqua River cutthroat trout	A fish found in the Umpqua River basin in coastal Oregon	Sept. 13, 1996	Apr. 26, 2000	An expanded review subsequent to listing showed that this population is part of another larger population of trout that did not warrant listing.
Lloyd's hedgehog cactus	A cactus primarily occurring in Texas and New Mexico	Oct. 26, 1979	June 24, 1999	Subsequent studies completed after the time of listing showed evidence indicating that the cactus is not a distinct species but rather is a hybrid.
Cuneate bidens	A flowering Hawaiian plant	Feb. 17, 1984	Feb. 6, 1996	Subsequent studies after the time of listing culminated in a taxonomic revision of the genus. The plant was determined to be no more than an outlying population of another common species, which is not significantly threatened.
Spineless hedgehog cactus	A cactus known to occur in southeastern Utah and southwestern Colorado	Nov. 7, 1979	Sept. 22, 1993	Subsequent to listing, several evaluations did not recognize the cactus as a distinct species and the consensus of botanists was that the cactus was only a form of another type of cactus which was much more widespread, occurring from Utah and Colorado south into central Mexico.

(Continued From Previous Page)

Species name	Description	Date listed	Date delisted	Reason delisted
Purple-spined hedgehog cactus	A cactus occurring in southwestern Utah	Oct. 11, 1979	Nov. 27, 1989	Several reviews after listing discovered that the characteristics of the purple-spined hedgehog cactus were simply morphological variations within the population of a more common species found throughout the Mojave Desert in southwestern Utah.
Mexican duck	A duck found throughout the southwestern U.S. and Mexico	Mar. 11, 1967	July 25, 1978	After the listing of the Mexican duck, the duck was determined to be a subspecies of the common mallard duck with a large zone of interbreeding between the two. Additional information also indicated that the loss of habitat throughout its range was no longer a threat that would qualify the species for listing.

Source: GAO analysis of U.S. Fish and Wildlife Service data.

Concerns Remain Over the Adequacy of Scientific Information Used in Making Critical Habitat Decisions

While external reviews indicate that the Service bases most critical habitat decisions on the best available science, concerns remain over the adequacy of the information available to support the decisions. Experts and others we spoke to explained that the amount of scientific information available on a species' habitat needs often may be limited, affecting the Service's ability to adequately define the habitat area required. Experts that peer reviewed proposed critical habitat designations generally supported the Service's decisions, though many provided additional clarifications or suggestions. While the courts have overturned few critical habitat decisions on the basis of inadequate science, scientific disagreements over these decisions continue.

Experts and Others Express Concerns About Critical Habitat Decisions

Experts and others knowledgeable about the Endangered Species Act have expressed concerns about the Service's ability to designate critical habitat for some listed species given the amount of information available on the species' habitat needs. Unlike listing decisions, which are more straightforward—requiring the Service to answer only a "yes or no" question as to whether a species warrants listing—critical habitat decisions often require more detailed knowledge about a species' life history and habitat needs and call for the Service to factor in the species' special management needs in addition to the economic impacts of the designation. Service officials, experts, and others we spoke to agreed that the amount of scientific information available is limited and often affects the Service's ability to adequately define the habitat essential to the species' conservation. While some interested parties stated that the Service designated areas too broadly and included lands unsuitable for several species, others said that the Service did not designate enough habitat for some listed species. According to Service officials, the resource and time constraints under which the Service's scientists work often preclude them from collecting new information and, as a result, the information available may limit their ability to produce adequate critical habitat designations for some species. We found that most scientific disagreements surrounding recent critical habitat designations concerned whether the area chosen as critical habitat is sufficiently defined or whether the overall information used to support the designation is adequate. (See app. IV for information on the nature of scientific controversy surrounding the Service's decisions to designate critical habitat for listed species.) In order to increase the amount of information available on which to base critical habitat designations, the Service and others, including the National Research Council, have recommended delaying designations until recovery plans are developed.[33]

Peer Reviewers Generally Support the Service's Critical Habitat Designations, but Raise Concerns about the Areas Selected

The Service received 69 peer-review responses for 27 of the 37 critical habitat decisions finalized during fiscal years 1999 through 2002; it received no responses for 10 decisions (see app. III). Reviewers providing comments in 17 of these decisions unanimously agreed with the Service's scientific conclusions or otherwise indicated support for the critical habitat designation. In six decisions, while not stating explicit agreement with the Service's use of science, the reviewer did not identify any major inadequacies or reasons for substantially modifying the proposed habitat.

[33]National Research Council, *Science and the Endangered Species Act* (Washington D.C.: National Academy Press, 1995) 71-93.

In another decision, the Service reported that five peer reviewers supported the decision and one was "neutral." One or more peer reviewers disagreed with the Service's proposed critical habitat designations for the remaining three decisions:

- *Zapata bladderpod*. The one reviewer responding to the proposed critical habitat designation of the Zapata bladderpod, a flowering plant that grows in Texas, stated that the areas selected on state and private lands were too small to support viable populations or the area was not always suitable habitat for the species. The reviewer also said it was premature to select those sites given the lack of information about the species.

- *Cactus ferruginous pygmy-owl*. The one reviewer responding to the proposed critical habitat designation for the cactus ferruginous pygmy-owl, a small bird found in the southwestern United States, disagreed with the designation on the grounds that there were too many unknowns about the species' habitat requirements to support a determination about its critical habitat.

- *Newcomb's snail*. Two of the six reviewers responding to the Service's proposed critical habitat determination for the Newcomb's snail (found only on the island of Kauai, Hawaii) disagreed with the proposed rule—the other four supported it. One of the reviewers who disagreed stated that there was inadequate information to make a determination because habitat requirements for the snail were limited to generalized observations in the field and thus were speculative. The reviewer said the designation did not identify the habitat features essential to the conservation of the species and was premature until additional biological information was obtained. Similarly, the other reviewer objecting to the determination did so largely because of his understanding that the process was based on few published scientific studies, and much was still unknown about the species' habitat requirements.

Even though peer reviewers may have concurred with the Service's critical habitat designation, many provided clarifications or suggested modifications. We analyzed the peer reviewers' responses for 16 of the 27 critical habitat decisions the Service made. There were 35 peer-review responses to these 16 decisions. Nearly all of the reviewers provided specific clarifications on information contained in the rule or suggestions for altering the habitat area selected. For instance, in many of the

responses, the reviewer agreed with the proposal in general, but stated that additional lands should be included in the critical habitat designation and cited scientific reasons for increasing habitat areas. In one decision, a reviewer generally supporting the proposed critical habitat of the arroyo toad (an endangered toad found in coastal and desert drainages in California) identified specific areas where he believed the toad ranged more widely and would therefore warrant additional critical habitat. Another reviewer, generally supporting the proposed critical habitat for the Great Lakes population of the piping plover (a small shorebird that occurs across North America), identified sites she believed should be added to the designation and areas she believed to be unsuitable for the species and therefore should be excluded from the designation.

Courts Have Overturned Few Critical Habitat Decisions on the Basis of Inadequate Science

As with listing decisions, and due in part to the deference the courts grant to the Service, most litigation has not directly challenged the Service's use of science in making critical habitat determinations. Based on a review of federal court cases decided during fiscal years 1999 through 2002, we identified 11 cases in which a court issued an opinion regarding the Service's critical habitat decisions. Most of these 11 cases dealt with nonscience issues, such as the Service's failure to designate critical habitat for a listed species. However, the courts overturned critical habitat decisions on the basis of issues related to the use of scientific data in the following two cases:[34]

- *Rio Grande silvery minnow.* In 2000, a federal court invalidated the critical habitat of the Rio Grande silvery minnow based in part on scientific grounds.[35] Multiple groups, including the state of New Mexico, challenged the designation of critical habitat for the silvery minnow, a fish found exclusively in the Rio Grande River in the Southwest. The critical habitat designation for this fish consisted of a 163-mile stretch of the main stem of the Rio Grande River. The court ruled in favor of the plaintiffs because it found that the Service's final rule had failed to (1) define with sufficient specificity what biological and physical features were essential to the species' survival and recovery and (2) indicate

[34]In fiscal year 2003, a court overturned one additional critical habitat decision of the Service partly on the basis of issues related to the use of scientific data. *See Home Builders Association of Northern California v. United States Fish and Wildlife Service*, No. CV F 01-5722 AWI SMS (E.D.Cal. May 9, 2003).

[35]*Middle Rio Grande Conservancy District v. Babbitt*, 206 F.Supp.2d 1156 (D.N.M. 2000), *aff'd*, 294 F.3d 1220 (10th Cir. 2002).

where in each reach of the river such features existed. For example, the court said that the Service's statement in the rule regarding the minnow's need for "sufficient flowing water" provided vague generalities that stated little more than what is required for any fish species. As a result of this court ruling, the Service is in the process of redesignating critical habitat for this species.

- *Cactus ferruginous pygmy-owl.* In 2001, a court struck down the critical habitat designation for the cactus ferruginous pygmy-owl because, among other reasons, the designation was not supported by the best available scientific data.[36] The final critical habitat for the pygmy-owl, a small bird found in the southwestern United States, consisted of over 700,000 acres of riparian and upland habitat in Arizona. The court noted that the determination of critical habitat is to be made on the basis of the "best scientific data available" and that this involves identifying geographic areas "essential to the conservation of the species." The court then pointed out that systematic owl surveys had not yet been completed over the entire potential habitat in Arizona, and that the Service determined critical habitat by designating areas where the pygmy-owls had been sighted, areas that it thought would be consistent with the species' known habitat, and all the land in between. The court also pointed out that, in addition to the areas actually occupied by the pygmy-owls, the Service had included areas where it thought they could live. The court appeared to conclude that, in order to include areas that were not presently occupied, the Service should have determined that such areas were in fact essential to the conservation of the species. Although the Service had already agreed to reconsider the economic analysis used in the critical habitat designation, the court concluded that a "broader reconsideration" of the critical habitat designation was necessary. The Service is in the process of redesignating critical habitat for the pygmy-owl.

[36]*National Association of Homebuilders v. Norton*, 2001 WL 1876349, No. 00-CV-903 (D.Ariz. 2001).

The Service Has Failed to Address Known Problems with the Critical Habitat Program

The Service's critical habitat program currently faces a serious crisis that extends well beyond the use of science in making decisions. Litigation now dominates the program, leading the Assistant Secretary for Fish and Wildlife and Parks in the Department of the Interior to recently declare that the system for designating critical habitat is "broken" because it provides little conservation benefit while consuming significant resources.

A key court case in 1997 invalidated the Service's position on when critical habitat should be designated. The Endangered Species Act generally requires the Service to designate critical habitat for listed species unless the Service determines it is "not prudent,"[37] and the Service's regulations spell out that it is not prudent to designate critical habitat if doing so would not be "beneficial to the species."[38] As a result, prior to 1997, the Service had designated critical habitat for only 113 of the 1,023 domestic species that it had listed. The Service reasoned that designating critical habitat did not benefit the species because the benefits that critical habitat provided duplicated those benefits provided by listing the species.[39] The 1997 court case invalidated the Service's reasoning, ruling that the Service's determination that it was not prudent to designate critical habitat for the coastal California gnatcatcher, a songbird unique to coastal southern California, was not justified.[40] One of the reasons that the Service concluded that it was not prudent to designate critical habitat was because it believed that such a designation would not appreciably benefit the

[37]16 U.S.C. §1533(a)(3).

[38]50 C.F.R. §424.12(a)(1)(ii). The regulation also provides that it is not prudent when the species is threatened by human activity and identification of the habitat can be expected to increase the threat.

[39]The Service's reasoning is based on its reading of the law, as implemented by its regulations. The benefit provided by a critical habitat designation is protection from federal agency actions—the act requires federal agencies to consult with the Service to ensure that any activities they carry out, fund, or authorize are not likely to result in the "destruction or adverse modification" of a critical habitat. 16 U.S.C. §1536(a)(2). The act also requires federal agencies to insure that their activities are not likely to "jeopardize the continued existence" of a listed species. *Id.* Service regulations define these two terms somewhat similarly. *See* 50 C.F.R. §402.02. The Service reasons that virtually any federal action that would destroy or adversely modify a species' critical habitat would also jeopardize the species' existence. The Service thus concludes that critical habitat designations do not provide additional conservation benefit beyond that already afforded all listed species.

[40]*Natural Resources Defense Council v. United States Department of the Interior*, 113 F.3d 1121 (9th Cir. 1997). *See* also *Sierra Club v. United States Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001).

species because most populations of gnatcatchers were found on private lands to which the act's critical habitat protections would not apply. The court found that this reasoning improperly expanded what Congress had intended to be a narrow exception to designating critical habitat. The court concluded that the Service had disregarded "the clear congressional intent that the imprudence exception be a rare exception." Since then, court orders and settlement agreements have compelled the Service to designate critical habitat for species for which it had previously determined that it was not prudent to do so.

Subsequently, a 2001 court case led the Service to reconsider some of its critical habitat designations.[41] The case involved the requirement of the act that the Service consider the economic impact of designating a particular area as critical habitat. According to the act, the Service may exclude areas from critical habitat if it determines that the benefits of excluding the area outweigh the benefits of including the area as critical habitat unless excluding it would result in the extinction of the species. For example, in 1997, the Service designated critical habitat for the southwestern willow flycatcher, a small bird that nests in riparian areas in the southwestern United States. Because the Service believed that designating critical habitat would not result in additional restrictions on activities beyond those resulting from listing the species, it reasoned that there would be no significant economic impact associated with designating critical habitat for the flycatcher.[42] However, the court disagreed. It found that since the act clearly barred the Service from considering economic impacts in listing decisions, but required they be considered in critical habitat decisions, the Service was not free to ignore the economic impacts of listing a species when designating critical habitat for that species. The court held that the Service had to consider all of the economic impacts of a critical habitat determination, regardless of whether those impacts were also attributable to listing or other causes. Since this decision was issued, court orders and settlement agreements have prompted the Service to re-issue some critical habitat decisions to comply with this standard.

[41]*New Mexico Cattle Growers v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

[42]The Service's approach was premised on the idea that designating critical habitat does not provide protection to a species beyond the protection already provided by listing the species. See footnote 39.

Since these two court rulings, the Service's critical habitat program has become dominated by litigation. Each critical habitat designation made since 1997 has resulted from a court order or a settlement agreement, and the Service expects that it will have to dedicate significant resources through fiscal year 2008 to comply with existing court orders and settlement agreements. The department believes that this flood of litigation over critical habitat designation is preventing the Service from taking what it deems to be higher priority activities, such as addressing the approximately 250 "candidate" species waiting to go through the listing process (listing and critical habitat activities are funded under the same line item in the department's budget). Service officials noted that there are other court decisions that may cause additional problems for the program in the future.

The Service has been aware of problems with its critical habitat program for a number of years. The Service noted significant problems with its critical habitat program in 1997,[43] and in 1999 it issued a *Federal Register* notice announcing that its system for designating critical habitat was not working and soliciting comments on its intention to develop policy or guidance and/or to revise regulations or seek legislative corrections to clarify the role of critical habitat in conserving endangered species.[44] In particular, the Service stated its intention to consider when critical habitat designation would provide additional protection beyond that provided by listing. The Service also announced its intention to streamline the process for designating critical habitat to be more cost-effective and in line with the amount of conservation benefit provided to the species. In particular, the Service declared that it needs to develop a much less labor-intensive process for describing the areas proposed for designation as critical habitat. The Service also stated that it can streamline and make more cost-effective the process to conduct the economic analyses required to designate critical habitat and that it can more efficiently conduct the analyses required under the National Environmental Policy Act. The Service also noted that critical habitat litigation and related court orders

[43]In the 1997 final rule designating critical habitat for the southwestern willow flycatcher, the Service stated that it was unable to provide the level of analysis and completeness that it has in previous rules because of a court imposed deadline—the result of the Service's previous determination that critical habitat provided little additional benefit to the species. Even with a minimal level of analysis and completeness, the Service noted that it had to disrupt significant work at the field office, regional, and national levels in order to provide the resources to complete the rule. *See* 62 *Fed. Reg.* 39129 (July 22, 1997).

[44]*See* 64 *Fed. Reg.* 31871 (June 14, 1999).

were consuming much of the resources devoted to listing and critical habitat, and delaying other activities that it considered higher priority, such as addressing petitions submitted by citizens, working with landowners on conservation projects, and completing final actions to list species. However, no additional guidance or revisions were issued, and the Service continues to follow the same unworkable system.

The Department of the Interior recently echoed concerns with the Service's critical habitat program and the limited conservation benefit it provides to species. In April 2003, the Assistant Secretary for Fish and Wildlife and Parks testified before Congress on the critical habitat program, stating that it is "broken" and in "chaos." He noted that litigation support is consuming valuable resources and that complying with court orders and settlement agreements has sharply reduced the Service's ability to prioritize its listing and critical habitat actions. Service scientists working in field offices expressed similar concerns to us about the critical habitat program, raising questions about the purpose of critical habitat and the designation process. An attorney in the Solicitor's office told us that guidance would improve the Service's critical habitat decisions and make the decisions more defensible in court in the future.

Despite the long-standing concerns over the role and implementation of the critical habitat program, the Service has done little to resolve them. In a report issued in June 2002, we recognized the impact that litigation was having on the critical habitat program and recommended that the Service expedite its efforts to develop guidance on designating critical habitat for listed species to help reduce the influence of future litigation.[45] Better guidance would help reduce the number of legal challenges to the Service's critical habitat designations and allow the Service to better withstand legal challenges when they arise. While the Service agreed with our recommendation, it responded that work on critical habitat guidance had been delayed pending Service efforts to complete higher priority tasks, including court orders to complete listing and critical habitat decisions and did not commit to a schedule for issuing the guidance. An official with Interior's Solicitor's office told us that one factor limiting the agency's ability to complete these tasks is the Service's inability to devote significant listing and critical habitat resources to policy initiatives without risking

[45]U.S. General Accounting Office, *Endangered Species Program: Information on How Funds Are Allocated and What Activities Are Emphasized*, GAO-02-581 (Washington, D.C.: June 25, 2002).

contempt of court because such action would force the agency to divert resources away from activities required to comply with court orders.

Conclusion

The Service's critical habitat program faces a serious crisis because of extensive litigation that is consuming significant program resources. The Service has recognized this crisis for many years but has done little to address it. Accordingly, in June 2002, we recommended that the Service expedite its efforts to develop guidance on designating critical habitat to reduce the influence of future litigation. While the Service agreed with our recommendation, it has done little to develop this guidance. Service officials complain that they are locked in a vicious cycle, precluded from developing the guidance for fear of being held in contempt of court for diverting resources away from activities already required by existing court orders. While the Service clearly faces a dilemma, it is imperative that it clarify the role of critical habitat and develop guidance for how and when it should be designated, and seek regulatory and/or legislative changes that may be necessary to provide threatened and endangered species with the greatest conservation benefit in the most cost-effective manner.

Recommendation for Executive Action

Because the Service's critical habitat program faces serious challenges, we recommend that the Secretary of the Interior require the Service to provide clear strategic direction for the critical habitat program, within a specified time frame, by clarifying the role of critical habitat and how and when it should be designated, and recommending policy/guidance, regulatory, and/or legislative changes necessary to provide the greatest conservation benefit to threatened and endangered species in the most cost-effective manner.

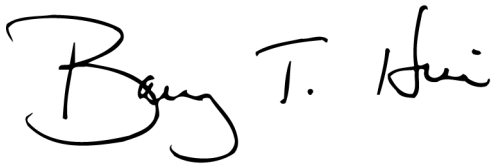
Agency Comments

We provided the Department of the Interior with a draft of this report. The department did not provide comments on the draft.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of the Interior and other interested parties. We also will make copies

available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staffs have any questions, please call me at (202) 512-3841. Key contributors to this report are listed in appendix V.



Barry T. Hill
Director, Natural Resources
and Environment

Objectives, Scope, and Methodology

This report assesses the U.S. Fish and Wildlife Service's consideration and use of science in its decisions to list species as threatened or endangered and to designate critical habitat.[1] Specifically, we were asked to review the extent to which (1) the Service's policies and practices ensure that listing and critical habitat decisions are based on the best available science and (2) outside reviewers have supported the scientific data and conclusions that the Service uses to make listing and critical habitat decisions. In no instance did we attempt to evaluate scientific data and render an opinion. For this evaluation, we define "science" as the collection and interpretation of biological information, such as the identification of a species and its habitat needs. This definition does not include the legal policies and definitions found in the law or used to implement or interpret the Endangered Species Act. However, we acknowledge that there is not always a clear distinction between the interpretation of biological information and the policies and definitions used to interpret the act.

In meeting our first objective, we examined the Service's decision-making process to determine the extent to which it would likely lead to decisions based on the best available science. We reviewed the Service's policies and procedures related to how it makes these decisions and discussed the process and procedures with key officials at the Service's headquarters and with staff in the Service's regional and field offices to determine their knowledge of the process and how they implemented it. We also spoke with peer-review experts and examined the literature on the processes that organizations use to peer review their decisions and products to assess the reasonableness of the Service's policy to peer review proposed listing and critical habitat decisions.

In meeting both objectives, we obtained from the Service a list of the decisions to list species and designate critical habitat that the Service finalized during fiscal years 1999 through 2002. To verify the completeness of the provided list of decisions, we compared it with a second independent database maintained by the Service. We identified one decision that was not on the original list provided to us by the Service. We included that decision in our analysis. Based on this information, we identified 101 final

[1]We focused on the U.S. Fish and Wildlife Service even though it shares responsibility with the National Marine Fisheries Service for implementing the Endangered Species Act because the Fish and Wildlife Service has lead responsibility, as of April 2003, for 1,237 of the 1,263 listed species in the United States. The two Services share responsibility for 6 species.

decisions to list or designate critical habitat that were published in the *Federal Register* during fiscal years 1999 through 2002.

We examined the *Federal Register* notices for the 101 decisions to determine (1) the extent to which the Service complied with its peer-review policy to request at least three peer reviewers to review each decision, (2) the number that reviewed each decision, and (3) whether or not the reviewer(s) supported the decision. In 61 of the 101 decisions, we extracted this information from the *Federal Register*. For the remaining 40 decisions, we contacted the 18 field offices responsible for the decisions and requested that they provide the peer-review documentation, including copies of the peer reviewers' responses. The Service provided us with the missing information in all but seven instances; in five of those instances partial information was available.

To assess the accuracy of the information reported in the *Federal Register* notices, we requested that the Service provide documentation for the peer-review information, including peer reviewers' responses, for 8 of the 61 decisions for which complete information was available in the *Federal Register* notice. We selected these 8 decisions in the following way. In order to minimize the burden on the Service's field staff, we limited our universe to the decisions that were the responsibility of the18 field offices that we already intended to contact. These offices were responsible for 48 of the 61 decisions for which there was complete information in the *Federal Register* notice. We then randomly chose 1 decision from each of the three offices with the most decisions. Collectively these offices were responsible for 25 of the 48 decisions. We also randomly chose 5 of the remaining 23 decisions. We compared the documentation provided to us with the information in the corresponding *Federal Register* notices. We found no discrepancies. However, we did find minor discrepancies between other *Federal Register* notices and the documentation the Service provided to us. We reconciled these discrepancies. Additionally, based on a limited review, we found the Service's procedures reasonable for ensuring that its database contains accurate information. For example, the Service regularly samples data recently added to the database for accuracy. We did not determine the extent to which any of the Service's final decisions reflected the comments and opinions of the peer reviewers.

In addition to determining whether peer reviewers supported the decision they reviewed, we performed a content analysis on the peer-review responses for 16 critical habitat decisions to more fully characterize the opinions of the peer reviewers. We chose to perform a content analysis on

the responses to critical habitat decisions because these decisions are open-ended, requiring the Service to determine how much critical habitat to designate and where that habitat should be located. There were 35 peer-review responses for these 16 decisions.

To determine how well the Service's listing and critical habitat decisions are withstanding legal challenges to the science supporting those decisions, we used common legal research methods to identify federal court cases related to the Service's listing and critical habitat decisions. We identified and reviewed 25 cases that were decided during fiscal years 1999 through 2002 that involved a challenge to a Service listing decision and/or critical habitat decision, and in which the court rendered a decision on the listing or critical habitat issue.

To determine the extent to which the Service has delisted species because new scientific information surfaced indicating that listing was not originally warranted, we used information from the Service's publicly accessible database. We included in our analysis all decisions to delist species from the inception of the act through March 2003. We compared this information with information published in the *Federal Register*. We found no discrepancies.

Finally, to get a fuller understanding of the degree of scientific controversy regarding listing and critical habitat decisions, we solicited the opinions of experts and others and reviewed published studies. To illustrate the nature of scientific controversy regarding listing and critical habitat decisions, we developed a list of decisions for which there was some degree of scientific controversy. We developed this list by asking experts in the private, academic, government, and nonprofit sectors spanning the political spectrum to identify recent decisions that were particularly controversial due to scientific disagreements and briefly explain the nature of the controversy. We limited our analysis to decisions finalized during fiscal years 1993 through 2002. In addition, we asked each expert for the names of other experts who could help us develop our list. We stopped contacting experts when we began to get repetitive responses. We then identified common issues related to the controversies to characterize the types of disagreements involved with each of the decisions. We based this on the information provided by the experts and information published in the *Federal Register*. Finally, we presented the list of decisions and related information to officials at the Service and at the National Academy of Sciences for their opinions on the list of decisions and how we

characterized them. The officials generally agreed with the information we presented.

Additionally, in the course of our work, it became apparent that litigation was dominating the Service's critical habitat program, and we discuss these circumstances in our report. Specifically, we describe how several key court cases are affecting the program.

We performed our work from September 2002 through June 2003 in accordance with generally accepted government auditing standards.

Overview of The Endangered Species Act

The Endangered Species Act was passed by Congress to provide a means to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover imperiled species. The act was passed in 1973 and replaced earlier laws, which provided for a list of endangered species but gave them little meaningful protection. While significant amendments were enacted in 1978, 1982, and 1988, the overall framework of the act has remained essentially unchanged. The Department of the Interior delegated its responsibility for the act to the U.S. Fish and Wildlife Service (Service), which established an endangered species program to implement the requirements of the act. The Service is responsible for all land-dwelling species, freshwater species, some marine mammals, and migratory birds. The Department of Commerce, which has delegated its responsibility to the National Marine Fisheries Service, is responsible for implementing the act for marine species including anadromous (both freshwater and ocean dwelling) fish.

The act provides numerous provisions to protect and recover species at risk of extinction. However, before a plant or animal species is eligible to benefit from most of these provisions, it must first be added to the Federal List of Endangered and Threatened Wildlife and Plants. Once on the list, key provisions of the act, including critical habitat, recovery plans, consultations with federal agencies, and habitat conservation plans, are designed to assist in recovering the species so that it can then be removed from the list.

Listing Species as Endangered or Threatened

Under the act, species may be listed as either endangered or threatened. An endangered species is any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species of animal or plant that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. All species of plants and animals (except pest insects) are eligible for listing as endangered or threatened. As of June 2003, there were a total of 1,821 listed species; 1,504 species on the endangered species list, 987 of which occur in the United States; and 317 threatened species, 276 of which occur in the United States.[1]

The decision to list a species must be based solely on the best available scientific and commercial data. Using these data, the Service must determine whether a species should be listed by analyzing its status based on the following factors: (1) current or threatened destruction, modification, or curtailment of a species habitat or range; (2) over utilization of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting the species' continued existence. The Service follows a rigorous process to determine whether to list a species. A final decision to list a species is published in the *Federal Register*.

The Service may issue emergency regulations to list a species without complying with the normal regulatory process if it finds that an emergency poses a significant risk to the well-being of any species. Emergency regulations take effect immediately upon publication in the *Federal Register* and are effective for 240 days.

The Service also maintains a list of candidate species. Candidate species are species for which substantial information is available to support a listing proposal, but have not yet been proposed for listing. The Service maintains this list for a variety of reasons, including (1) to provide advance knowledge of potential listings that could affect decisions of environmental

[1]The List of Endangered and Threatened Wildlife and Plants created under the act identifies listed species as either domestic or foreign. The Service's Endangered Species Program deals primarily with domestic species found in the U.S. and U.S. territories, while the International Affairs Program of the Service deals primarily with foreign endangered species—including issuing permits for their import or export and representing the Service under the Convention on International Trade in Endangered Species (CITES).

planners and developers, (2) to solicit input from interested parties to identify those candidate species that may not require protection under the act or additional species that may require the act's protections, and (3) to solicit information needed to prioritize the order in which species will be proposed for listing. The Service is required to publish a notice of review annually in the *Federal Register* to solicit new information on the status of candidate species. The Service works with parties, such as states and private partners, to carry out conservation actions—often called Candidate Conservation Agreements—for candidate species to prevent their further decline and possibly eliminate the need to list them as endangered or threatened. As of June 2003, there were 251 candidate species, many of which have held that status for more than a decade.

Critical Habitat

The Service is generally required to designate critical habitat at the time a species is listed as endangered or threatened. Critical habitat is the specific geographic area essential for the conservation of a threatened or endangered species and that may require special management considerations and protection. Critical habitat contains physical and biological habitat features such as: (1) space for individual and population growth and for normal behavior; (2) cover or shelter, food, water, air, light, minerals, or other nutritional or physiological requirements; (3) sites for breeding and rearing offspring; and (4) habitats that are protected from disturbances or are representative of the historic geographical and ecological distributions of a species. Critical habitat may also include areas not occupied by the species at the time of listing but that are essential to the conservation and recovery of the species. Unlike the decision to list a species as endangered or threatened, a final designation of critical habitat is to be made on the basis of not only the best scientific data available but also taking into consideration the economic and other effects of making the decision. If the benefits of excluding an area outweigh the benefits of including it, the Service may exclude an area from critical habitat, unless the exclusion would result in the extinction of the species.

The Service may take up to an additional year after listing a species to designate critical habitat if it finds that critical habitat is "not determinable." Critical habitat is not determinable when information sufficient to perform the required analyses of the impacts of the designation of critical habitat is lacking or the biological needs of the species are not sufficiently known to permit identification of an area as critical habitat. The Service does not designate critical habitat if it determines that doing so would be "not prudent." It would not be prudent

to designate critical habitat if (1) identifying the habitat is expected to increase the threat to the species or (2) designating an area as critical habitat is not expected to benefit the species.

Recovery Plans

Once a species is listed, the act requires the Service to develop a recovery plan for the species. Recovery plans identify, justify, and schedule the research and management actions necessary to reverse the decline of a species and ensure its long-term survival. Recovery plans must be developed for all listed species, unless such a plan would not benefit the species. Although the act does not specify time frames for developing or implementing the recovery plan or for recovering the species, the Service has as a goal of developing recovery plans within 1 year and having approved plans within 2½ years of a species' listing. The Service solicits comments from state and federal agencies, experts and the public on draft recovery plans during a formal public comment period announced in the *Federal Register*. The Service periodically reviews approved recovery plans to determine if updates or revisions are needed. As of June 2003, 1000 species had approved recovery plans.

Consultations with Federal Agencies

Federal agencies are required to consult with the Service if their actions may affect listed species. The goal of the consultation process is to identify and resolve conflicts between the protection and enhancement of listed species and proposed federal actions. The act requires that all federal agencies consult with the Service to ensure that any activities agencies permit, fund, or conduct are not likely to jeopardize the continued existence of a listed species or adversely modify its critical habitat. Federal agencies may informally consult with the Service to determine whether their actions may affect listed species and must proceed to formal consultations once they determine that their actions may adversely affect a listed species or its habitat. The act requires a formal consultation to be completed in 90 days, unless the Service and the federal agency mutually agree to an extension, with the applicant's consent. The Service is to issue a "biological opinion" within 45 days of the conclusion of formal consultation that reviews the potential effects of the proposed action on listed species and/or critical habitat. The Service must base the biological opinion on the best available biological information. If the Service finds that the action would appreciably reduce the likelihood of the species' survival and recovery, it issues a jeopardy biological opinion. Jeopardy opinions include reasonable and prudent alternatives that define

modifications to the agency's proposed action that enable it to continue and still be consistent with the act's requirements for protecting species. Following the issuance of the biological opinion, the federal agency determines whether it will comply with the opinion or seek an exemption from the act's requirements.

Proposed federal agency actions that have been determined to cause jeopardy to any listed species may receive an exemption from the act by the Federal Endangered Species Committee (also referred to as the "God Squad"). The Endangered Species Committee is comprised of seven members: the Secretary of Agriculture, the Secretary of the Army, Chairman of the Council of Economic Advisors, the Administrator of the Environmental Protection Agency, the Secretary of the Interior, the Administrator of the National Oceanic and Atmospheric Administration, and one individual from the affected state. An exemption is granted if at least five members of the Endangered Species Committee determine that, among other things, the action is of regional or national significance, that the benefits of the action clearly outweigh the benefits of conserving the species, and that there are no reasonable and prudent alternatives to the action. The Endangered Species Committee has been convened only three times since its creation in 1978—the Tellico Dam for the snail darter fish in Tennessee, the Grayrocks Dam in Wyoming for the whooping crane, and Bureau of Land Management (BLM) timber sales for the spotted owl in Oregon. Only two exemptions were granted. One was in regard to the Grayrocks dam and the other was to approve 13 timber sales sought by BLM (which was withdrawn before the completion of appeals). The Tellico dam application was denied but was later allowed by Congress to proceed.[2] In addition, three other applications were received but were subsequently dismissed or withdrawn before deliberations took place.

[2]Energy and Water Development Appropriations Act of 1980, Pub. L. No. 96-69, 93 Stat. 437, 449 (1979).

Habitat Conservation Plans

The act generally prohibits any person from "taking" an animal species listed as endangered.[3] "Taking" or "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect a listed species, and under Service guidelines, includes the destruction of the species' habitat. However, in 1982, Congress amended the act to include a process whereby the Service may issue permits that allow private individuals to incidentally take listed species. Incidental take is the take of any federally listed species that is incidental to, but not the purpose of, otherwise lawful activities. Permit applicants are required to submit a habitat conservation plan, which includes measures the applicant will take to minimize and mitigate the impacts that may result from the taking. The Service is required to publish a notice in the *Federal Register* soliciting comments from interested parties on each application for a permit and its accompanying habitat conservation plan. As of April 2003, 416 habitat conservation plans have been approved. The act prohibits the Service from issuing a permit if doing so would appreciably reduce the likelihood of the survival and recovery of the species in the wild. The incidental taking of a listed species resulting from federal agency actions may also be allowed under the act and would be addressed through the consultation process.

[3]16 U.S.C. §1538(a)(1)(B), (C). The Endangered Species Act prohibits the taking of endangered, but not threatened, species. However, the act authorizes the Service to, by regulation, prohibit the taking of a threatened species. The Service has issued a regulation extending the take prohibitions to threatened species, except for those covered by a specific rule, exemption, or permit. 50 C.F.R. §17.31.

Peer Reviewers' Responses to Listing and Critical Habitat Decisions for Fiscal Years 1999 through 2002

Federal Register title and number	Date	Peer reviewers		Peer reviewers' response			
		Asked	Responded	Agree	Disagree	Neutral	Unknown/ unclear
Listing decisions							
Determination of Endangered or Threatened Status for Five Desert Milk-vetch Taxa From California (63 FR 53596)	Oct. 6, 1998	3	2	2			
Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils (63 FR 54975)	Oct. 13, 1998	3	1	1			
Determinations of Endangered or Threatened Status for Four Plants (63 FR 54938)	Oct. 13, 1998	3	2	2			
Endangered or Threatened Status for Three Plants from the Chaparral and Scrub of Southwestern California (63 FR 54956)	Oct. 13, 1998	3	0				
Endangered Status for Three Aquatic Snails, and Threatened Status for Three Aquatic Snails in the Mobile River Basin of Alabama (63 FR 57610)	Oct. 28, 1998	4	1	1			
Determination of Threatened Status for Virginia Sneezeweed (*Helenium virginicum*) a Plant From the Shenandoah Valley of Virginia (63 FR 59239)	Nov. 3, 1998	3	2	2			
Final Rule to List the Arkansas River Basin Population of the Arkansas River Shiner (*Notropis girardi*) as Threatened (63 FR 64772)	Nov. 23, 1998	20	1	1			
Final Rule To List the Topeka Shiner as Endangered (63 FR 69008)	Dec. 15, 1998	3	1	1			
Determination of Endangered Status for the St. Andrew Beach Mouse (63 FR 70053)	Dec. 18, 1998	4	4	4			
Determination of Threatened Status for the Sacramento Splittail (64 FR 5963)	Feb. 8, 1999	3	0				

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		Peer reviewers		Peer reviewers' response			
Federal Register **title and number**	**Date**	**Asked**	**Responded**	**Agree**	**Disagree**	**Neutral**	**Unknown/ unclear**
Determination of Endangered Status for *Catesbaea Melanocarpa* (64 FR 13116)	Mar 17, 1999	4	0				
Final Rule To List the Flatwoods Salamander as a Threatened Species (64 FR 15691)	Apr. 1, 1999	4	3	3			
Threatened Status for the Plant *Thelypodium howellii ssp. spectabilis* (Howell's spectacular thelypody) (64 FR 28393)	May 26, 1999	3	2	2			
Determination of Endangered Status for the Plant *Eriogonum apricum* (inclusive of *vars. apricum and prostratum*) (Ione Buckwheat) and Threatened Status for the Plant *Arctostaphylos myrtifolia* (64 FR 28403)	May 26, 1999	3	1	1			
Threatened Status for Lake Erie Water Snakes (*Nerodia sipedon insularum*) on the Offshore Islands of Western Lake Erie (64 FR 47126)	Aug. 30, 1999	[a]					
Final Endangered Status for 10 Plant Taxa From Maui Nui, HI (64 FR 48307)	Sep. 3, 1999	6	0				
Final Rule to List the Devils River Minnow as Threatened (64 FR 56596)	Oct. 20, 1999	5	4	4			
Final Rule to List *Astragalus desereticus* (Desert milk-vetch) as Threatened (64 FR 56590)	Oct. 20, 1999	3	3	3			
Determination of Threatened Status for the Plant *Helianthus paradoxicus* (Pecos Sunflower) (64 FR 56582)	Oct. 20, 1999	3	2	2			
Determination of Threatened Status for Bull Trout in the Coterminous United States (64 FR 58910)	Nov. 1, 1999	6	1	1			

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		Peer reviewers		Peer reviewers' response			
***Federal Register* title and number**	**Date**	**Asked**	**Responded**	**Agree**	**Disagree**	**Neutral**	**Unknown/ unclear**
Determination of Endangered Status for the Plant *Lesquerella thamnophila* (Zapata Bladderpod) (64 FR 63745)	Nov. 22, 1999	29	3	3			
Final Endangered Status for the Plant *Fritillaria gentneri* (Gentner's fritillary) (64 FR 69195)	Dec. 10, 1999	[b]	4	4			
Determination of Endangered Status for *Sidalcea oregana var. calva* (Wenatchee Mountains Checker-Mallow) (64 FR 71680)	Dec. 22, 1999	3	3	3[c]			
Final Rule To List the Sierra Nevada Distinct Population Segment of the California Bighorn Sheep as Endangered (65 FR 20)	Jan. 3, 2000	3	3	3			
Final Rule To List Two Cave Animals From Kauai, Hawaii, as Endangered (65 FR 2348)	Jan. 14, 2000	3	1	1			
Endangered Status for *Erigeron decumbens var. decumbens* (Willamette Daisy) and Fender's Blue Butterfly (*Icaricia icarioides fenderi*) and Threatened Status for *Lupinus sulphureus ssp. Kincaidii* (65 FR 3875)	Jan. 25, 2000	[b]	6	6			
Endangered Status for the Plant *Plagiobothrys hirtus* (Rough Popcornflower) (65 FR 3866)	Jan. 25, 2000	[b]	2	2			
Determination of Endangered Status for Two Larkspurs From Coastal Northern California (65 FR 4156)	Jan. 26, 2000	3	3	3			
Determination of Threatened Status for Newcomb's Snail From the Hawaiian Islands (65 FR 4162)	Jan. 26, 2000	3	3	3			
Determination of Endangered Status for Blackburn's Sphinx Moth from the Hawaiian Islands (65 FR 4770)	Feb. 1, 2000	3	0				

(Continued From Previous Page)

		Peer reviewers		Peer reviewers' response			
Federal Register **title and number**	**Date**	**Asked**	**Responded**	**Agree**	**Disagree**	**Neutral**	**Unknown/ unclear**
Determination of Endangered Status for the Plant Yreka Phlox from Siskiyou County, CA (65 FR 5268)	Feb. 3, 2000	3	1	1			
Determination of Endangered Status for the Plant *Thlaspi californicum* (Kneel and Prairie Penny-Cress) From Coastal Northern California (65 FR 6332)	Feb. 9, 2000	3	0				
Determination of Endangered Status for *Sidalcea keckii* (Keck's checker-mallow) From Fresno and Tulare Counties, CA (65 FR 7757)	Feb. 16, 2000	3	2	2			
Final Rule to List the Riparian Brush Rabbit and the Riparian, or San Joaquin Valley, Woodrat as Endangered (65 FR 8881)	Feb. 23, 2000	4	2	2			
Endangered Status for the Armored Snail and Slender Campeloma (65 FR 10033)	Feb. 25, 2000	2	0				
Threatened Status for *Holocarpha macradenia* (Santa Cruz tarplant) (65 FR 14898)	Mar. 20, 2000	4	4	3		1	
Determination of Threatened Status for *Chlorogalum purpureum* (Purple Amole), a Plant From the South Coast Ranges of California (65 FR 14878)	Mar. 20, 2000	3	2	2			
Final Rule for Endangered Status for Four Plants From South Central Coastal California (65 FR 14888)	Mar. 20, 2000	3	2	2			
Determination of Threatened Status for the Contiguous U.S. Distinct Population Segment of the Canada Lynx (65 FR 16052)	Mar. 24, 2000	6	2	2			
Determination of Threatened Status for the Northern Idaho Ground Squirrel (65 FR 17779)	Apr. 5, 2000	1	1				1[b]

(Continued From Previous Page)

		Peer reviewers		Peer reviewers' response			
Federal Register **title and number**	**Date**	**Asked**	**Responded**	**Agree**	**Disagree**	**Neutral**	**Unknown/ unclear**
Threatened Status for the Santa Ana Sucker (65 FR 19686)	Apr. 12, 2000	4	2	2			
Final Rule To List as Endangered the O'ahu 'Elepaio From the Hawaiian Islands and Determination of Whether Designation of Critical Habitat Is Prudent (65 FR 20760)	Apr. 18, 2000	4	2	2			
Final Rule To List the Alabama Sturgeon as Endangered (65 FR 26438)	May 5, 2000	5	5	4	1		
Final Rule To List the Short-Tailed Albatross as Endangered in the United States (65 FR 46643)	Jul. 31, 2000	5	3	3			
Final Rule To List the Santa Barbara County Distinct Population of the California Tiger Salamander as Endangered (65 FR 57242)	Sep. 21, 2000	8	6	6			
Endangered and Threatened Wildlife and Plants: Threatened Status for the Colorado Butterfly Plant (*Gaura neomexicana ssp. coloradensis*) From Southeastern Wyoming, Northcentral Colorado, and Extreme Western Nebraska (65 FR 62302)	Oct. 18, 2000	3	2	2			
Final Endangered Status for a Distinct Population Segment of Anadromous Atlantic Salmon (*Salmo salar*) in the Gulf of Maine (65 FR 69459)	Nov. 17, 2000	6	3	3			
Final Rule to List Nine Bexar County, Texas Invertebrate Species as Endangered (65 FR 81419)	Dec. 26, 2000	9	0				
Final Rule for Endangered Status for *Astragalus pycnostachyus var. lan osissimus* (Ventura marsh milk-vetch) (66 FR 27901)	May 21, 2001	3	1	1			

(Continued From Previous Page)

Federal Register title and number	Date	Peer reviewers		Peer reviewers' response			
		Asked	Responded	Agree	Disagree	Neutral	Unknown/ unclear
Determination of Endangered status for *Astragalus holmgreniorum* (Holmgren milk-vetch) and *Astragalus ampullarioides* (Shivwits milk-vetch) (66 FR 49560)	Sep. 28, 2001	4	3	3			
Endangered Status for the Ohlone Tiger Beetle (*Cicindela ohlone*) (66 FR 50340)	Oct. 3, 2001	3	3	3			
Determination of Endangered Status for the Scaleshell Mussel (66 FR 51322)	Oct. 9, 2001	4	2	2			
Final Rule To List *Silene spaldingii* (Spalding's Catchfly) as Threatened (66 FR 51597)	Oct. 10, 2001	3	3	3			
Final Rule To List the Vermilion Darter as Endangered (66 FR 59367)	Nov. 28, 2001	3	3	3			
Final Rule To List the Mississippi Gopher Frog Distinct Population Segment of Dusky Gopher Frog as Endangered (66 FR 62993)	Dec. 4, 2001	3	3	3			
Endangered Status for *Carex lutea* (Golden Sedge) (67 FR 3120)	Jan. 23, 2002	5	0				
Determination of Endangered Status for the Washington Plant *Hackelia venusta* (Showy Stickseed) (67 FR 5515)	Feb. 6, 2002	3	3	3			
Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*) (67 FR 10101)	Mar. 6, 2002	5	4	3			1[b]
Listing the Desert Yellowhead as Threatened (67 FR 11442)	Mar. 14, 2002	3	2	1	1		
Listing of the Chiricahua Leopard Frog (*Rana chiricahuensis*) (67 FR 40789)	Jun. 13, 2002	4	4	4			
Determination of Endangered Status for the Southern California Distinct Vertebrate Population Segment of the Mountain Yellow-legged Frog (*Rana muscosa*) (67 FR 44382)	Jul. 2, 2002	6	6	6			

(Continued From Previous Page)

Federal Register title and number	Date	Peer reviewers		Peer reviewers' response			
		Asked	Responded	Agree	Disagree	Neutral	Unknown/ unclear
Determination of Endangered Status for *Ambrosia pumila* (San Diego Ambrosia) from Southern California (67 FR 44372)	Jul. 2, 2002	3	1	1			
Determination of Endangered Status for the Carson Wandering Skipper (67 FR 51116)	Aug. 7, 2002	4	3	2		1	
Determination of Endangered Status for the Tumbling Creek Cavesnail (67 FR 52879)	Aug. 14, 2002	5	5	5			
Critical habitat decisions							
Final Designation of Critical Habitat for the Rio Grande Silvery Minnow (64 FR 36274)	Jul. 6, 1999	4	1	1			
Designation of Critical Habitat for the Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) (64 FR 37419)	Jul. 12, 1999	4	1		1		
Designation of Critical Habitat for the Huachuca Water Umbel (64 FR 37441)	Jul. 12, 1999	3	1	1			
Designation of Critical Habitat for the Pacific Coast Population of the Western Snowy Plover (64 FR 68507)	Dec. 7, 1999	[b]					
Designation of Critical Habitat for the Woundfin and Virgin River Chub (65 FR 4140)	Jan. 26, 2000	0	0				
Final Designation of Critical Habitat for the Spikedace and the Loach Minnow (65 FR 24328)	Apr. 25, 2000	4	2	2			
Final Determination of Critical Habitat for the Alameda Whipsnake (*Masticop his lateralis euryxanthus*) (65 FR 58933)	Oct. 3, 2000	[b]					
Final Determination of Critical Habitat for the San Diego Fairy Shrimp (*Branchinecta sandiegoensis*) (65 FR 63438)	Oct. 23, 2000	4	2				2

(Continued From Previous Page)

		Peer reviewers		Peer reviewers' response			
Federal Register **title and number**	**Date**	**Asked**	**Responded**	**Agree**	**Disagree**	**Neutral**	**Unknown/ unclear**
Final Determination of Critical Habitat for the Coastal California Gnatcatcher (65 FR 63680)	Oct. 24, 2000	4	0				
Designation of Critical Habit at for the Tidewater Goby (65 FR 69693)	Nov. 20, 2000	4	2	1			1
Final Designation of Critical Habitat for the Plant *Lesquerella Thamnophila* (Zapata Bladderpod) (65 FR 81182)	Dec. 22, 2000	4	1		1		
Final Designation of Critical Habitat for the Mexican Spotted Owl (66 FR 8530)	Feb. 1, 2001	7	2	2			
Final Determination of Critical Habitat for Peninsular Bighorn Sheep (66 FR 8650)	Feb. 1, 2001	4	0				
Final Determination of Critical Habitat for the Alaska-Breeding Population of Steller's Eider (66 FR 8850)	Feb. 2, 2001	5	2	2			
Final Determination of Critical Habitat for the Spectacled Eider (66 FR 9146)	Feb. 6, 2001	3	3	2			1
Final Designation of Critical Habitat for the Arroyo Toad (66 FR 9414)	Feb. 7, 2001	5	2	2			
Final Determination of Critical Habitat for the Zayante Band-Winged Grasshopper (66 FR 9219)	Feb. 7, 2001	3	2	2			
Final Determination of Critical Habitat for the Morro Shoulderband Snail (66 FR 9233)	Feb. 7, 2000	3	2	1			1
Final Determinations of Critical Habitat for the California Red-legged Frog (66 FR 14626)	Mar. 13, 2001	5	2	2			
Final Designation of Critical Habitat for the Arkansas River Basin Population of the Arkansas River Shiner (66 FR 18002)	Apr. 4, 2001	9	0				

(Continued From Previous Page)

Federal Register title and number	Date	Peer reviewers		Peer reviewers' response			
		Asked	Responded	Agree	Disagree	Neutral	Unknown/ unclear
Final Determination of Critical Habitat for the Bay Checkerspot Butterfly (*Euphydryas editha bayensis*) (66 FR 21450)	Apr. 30, 2001	4	3	3			
Final Determination of Critical Habitat for the Great Lakes Breeding Population of the Piping Plover (66 FR 22938)	May 7, 2001	3	3	2			1
Final Designation of Critical Habitat for the Riverside Fairy Shrimp (66 FR 29384)	May 30, 2001	4	2	1			1
Designation of Critical Habitat for the Spruce-fir Moss Spider (66 FR 35547)	Jul. 6, 2001	4	0				
Final Determination of Critical Habitat for Wintering Piping Plovers (66 FR 36138)	Jul. 10, 2001	5	3	3			
Final Designation of Critical Habitat for *Sidalcea oregana var. calva* (Wenatchee Mountains checker-mallow) (66 FR 46536)	Sep. 6, 2001	3	1	1			
Final Designation of Critical Habitat for the Kootenai River Population of the White Sturgeon (66 FR 46548)	Sep. 6, 2001	4	2	2			
Determination of Critical Habitat for the Oahu Elepaio (*Chasiempis san dwichensis ibidis*) (66 FR 63752)	Dec. 10, 2001	3	3	3			
Designation of Critical Habitat for the Quino Checkerspot Butterfly (*Euphydryas editha quino*) (67 FR 18356)	Apr. 15, 2002	5	0				
Final Designation of Critical Habitat for the San Bernardino Kangaroo Rat (67 FR 19812)	Apr. 23, 2002	9	6	5		1	
Critical Habitat Designation for *Chorizanthe robusta var. robusta* (Robust Spineflower) (67 FR 36822)	May 28, 2002	3	3	3			

(Continued From Previous Page)

Federal Register title and number	Date	Peer reviewers		Peer reviewers' response			
		Asked	Responded	Agree	Disagree	Neutral	Unknown/ unclear
Designation of Critical Habitat for *Chorizanthe pungens var. pungens* (Monterey Spineflower) (67 FR 37498)	May 29, 2002	4	4	4			
Critical Habitat Designation for *Chorizanthe robusta var. hartwegii* (Scotts Valley Spineflower) (67 FR 37336)	May 29, 2002	3	3	3			
Designation of Critical Habitat for the Carolina Heelsplitter (67 FR 44502)	Jul. 2, 2002	3	0				
Designation of Critical Habitat for Newcomb's Snail (67 FR 54026)	Aug. 20, 2002	6	6	4	2		
Designation of Critical Habit at for the Northern Great Plains Breeding Population of the Piping Plover (67 FR 57638)	Sep. 11, 2002	9	5	5			
Appalachian elktoe final critical habitat (67 FR 61016)	Sep. 27, 2002	4	0				

Source: GAO analysis of U.S. Fish and Wildlife Service data.

[a]The Service's peer review policy does not apply to this decision because its most recent comment period opened before the policy became effective.

[b]Documentation unavailable.

[c]In one instance, the peer reviewer did not explicitly state agreement with the decision, but his comments do not bring up anything to suggest disagreement; rather, he provided only minor clarifications to the proposed decision document.

The Nature of Scientific Controversy Surrounding Listing and Critical Habitat Decisions

Based on discussions with Service officials, experts, and others knowledgeable about the Endangered Species Act, we found that several scientific disagreements over Service listing decisions have surfaced in recent years—mostly concerning whether the amount of information available at the time a decision is made suffices as a basis for a decision. Regarding critical habitat decisions, we found there has been scientific controversy surrounding whether the areas chosen as critical habitat is sufficiently defined or the overall information used to support the designation is adequate.

Listing

Although we found that scientific disagreements surrounding listing decisions are not widespread, some of the controversy in recent years can be categorized as "science-related." Experts and others working with the Endangered Species Act that we spoke with identified 11 species where there was significant scientific controversy surrounding the decisions to list the species.[1] Our discussions with these individuals and a review of related *Federal Register* notices revealed that the most common scientific disagreements hinge on whether enough information was available to determine (1) whether the plants or animals under consideration qualified as a "species" as defined by the act, (2) the status of the species, or (3) the degree of threat that the species faces.

Critics of some listing decisions argued that the Service lacked information to determine whether the entity in question met the definition of a "species." The act defines a species as including "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature."[2] There is general agreement within the scientific community as to what constitutes a species and this has not been a major source of controversy in most listing decisions.[3] Disagreements typically arise over whether entities that are genetically, morphologically, or behaviorally distinct, but not distinct

[1]In total, these experts identified 25 species where they believed there was significant scientific controversy regarding listing the species. We limited our review to only those species that had been formally listed within the past 10 years; we excluded 14 species from our review either because the species was not listed or because it was listed prior to 1993.

[2]16 U.S.C. §1532(16).

[3]While there are differing definitions for the term species, it is often defined as groups of interbreeding natural populations that are reproductively isolated from other such groups.

enough to merit the rank of species; qualify for protection as a distinct population segment (DPS). Under Service policy, to be identified as a DPS, a population segment must be both discrete and significant.[4] In order to be discrete, the population must be markedly separate from other populations as a consequence of physical, physiological, ecological, or behavioral factors. If a population segment is considered discrete, its biological and ecological significance will then be considered. This consideration would include such factors as evidence that the loss of the population would result in a significant gap in the range of a species.

For example, disagreement surrounded the decision to list the population of the Sonoma County California tiger salamander, a large terrestrial salamander that is native to California. According to critics of the listing decision, the results of genetic testing did not show the salamander to be distinct, or discrete, from other populations of the California tiger salamander and therefore the population did not qualify as a DPS. The Service disagreed with the critics' interpretation of the data, stating that it believed the data referred to by the critics show the salamander to be distinct from other populations. The Service said that additional sampling and genetic work provided further substantial evidence of the genetic discreteness of the population. Additionally, the Service relied on the salamander's geographic isolation in making a determination that the population qualified for protection as a DPS.

Service policy also allows international governmental boundaries that delineate differences in the management of the species or its habitat to be used to determine if a species meets the discrete criterion. Some critics have argued against using international boundaries as a criterion to define a DPS. For example, critics of the decision to list the Arizona population segment of the cactus ferruginous pygmy-owl stated that the Service had no biological or regulatory authority to rely on international boundaries to draw a distinct population segment. The pygmy-owl is a small bird that occurs in the southwestern United States extending south into Mexico.

The Service recognizes that using international boundaries as a measure of discreteness may introduce a nonbiological element to the recognition of a distinct population segment. However, in its policy, the Service determined that it is reasonable to recognize units delimited by international boundaries when these units coincide with differences in the management,

[4]61 *Fed. Reg.* 4722 (Feb. 7, 1996).

status, or exploitation of a species. In the case of the pygmy-owl, the Service reported the status of the owl in the United States is different from that in Mexico, and Arizona is the only area within which the government of the United States can affect protection and recovery for the species, so it was appropriate to protect the pygmy-owl as a DPS.

In its review of science and the Endangered Species Act, the National Research Council found that although it may be appropriate to delineate population segments based on political boundaries, there are no scientific reasons to do so as these boundaries often do not always coincide with major natural geographic boundaries.[5] To provide more scientific objectivity in identifying distinct population segments, the Council recommended that the Service define a distinct population segment based solely on scientific grounds and limit the definition to segments of biological diversity containing the potential for a unique evolutionary future. Such segments would be determined by looking at such factors as a population's morphology (or physical appearance), behavior, genetics and geographical separation or isolation from other populations. Service officials agree that the inclusion of international boundaries in determining whether a population segment is discrete is sometimes undertaken as a matter of policy rather than science. However, the Service believes that using international borders is appropriate and necessary to comply with congressional intent. When there are international boundaries that coincide with differences in the management, status, or exploitation of a species, as described above, the Service stated that it is appropriate to recognize these borders when making a listing determination.

Scientific disagreement also surrounds the status of a species and the degree to which identified threats imperil it. When making a listing determination, the Service must evaluate a species' status, such as where it occurs or its population numbers, and the degree of threat it faces. The Service can determine that a species is threatened or endangered because of any of several factors such as the destruction of habitat, disease or predation, or other natural or manmade factors affecting the species' survival. Several of the scientific disputes that we encountered centered on how widespread the species in question is or how intense or significant the threats to the species are. For example, state agencies commenting on the proposal to list the Canada lynx said that the rule failed to demonstrate

[5]National Research Council, *Science and the Endangered Species Act* (Washington D.C.: National Academy Press, 1995) 71-93.

there were significant reductions to the species' population. Critics of the rule said that the scientific information—which was largely in the form of one comprehensive report—failed to assess lynx population size, status, and trends. The Service agreed that the available information concerning lynx population status, trends, and historic range is limited. However, after reviewing historic and current records for both Canada and the United States, sightings and track records, personal communications with lynx, hare, and forest ecology experts, and a review of all available literature, the Service said it was able to make several conclusions about the status of the lynx and found that it warranted listing as threatened.

Figure 5: Canada lynx

Source: U.S. Fish and Wildlife Service.

Note: The Canada lynx is a medium-sized cat that is adapted for hunting in the deep snow, and is known to prey primarily upon the snowshoe hare. In the contiguous United States, the distribution of the lynx is known from the Cascade and Rocky Mountain Ranges in the West, the western Great Lakes Region, and along the Appalachian Mountain Range of the northeastern portion of the country.

Additionally, critics of the proposal to list the lynx claimed that the Service failed to demonstrate significant threats to the lynx's survival. For example, some stated that there is little evidence to support claims that current management practices, including timber harvesting and human access,

adversely affect the lynx. While the Service acknowledged the lack of quantifiable information to determine whether some of the possible threats have or would have resulted in lynx declines, it concluded that the factor threatening lynx in the contiguous United States is the lack of guidance in existing federal land management plans for conservation of lynx and lynx habitat.

Service officials told us that it is important to consider both the threats and the status of the species when making a listing determination. For example, if only a species' population numbers were considered, it might appear to be abundant. Once the threats are factored in, however, the species might be threatened or endangered. On the other hand, if the species numbers are low but the species faces no considerable threats, it may not warrant protection under the act.

Critical Habitat

Experts and others we spoke to identified 10 species where there was scientific controversy concerning the decision to designate critical habitat for them.[6] For example, one concern is whether the area chosen as critical habitat is sufficiently defined or the overall information used to support the designation is adequate. Most of the identified species are widespread or occur in rapidly developing areas, such as southern California.

One of the major sources of disagreement is the way in which the Service identifies land to be included in critical habitat. The Service is required to designate as critical habitat those areas that it deems essential to a species' conservation and that may require special management considerations and protection. To reach this conclusion, the Service describes the species' habitat needs for conservation, or the species' "primary constituent elements," such as nesting or spawning grounds, feeding sites, or areas with specific geologic features or soil types. The Service's regulations also require the delineation of critical habitat using reference points and lines as found on standard topographic maps of the area. The Service uses written descriptions and/or maps to outline the areas it considers critical habitat for a listed species. In some cases, when maps are used to outline the area,

[6]In total, these experts identified 13 species where there was scientific controversy concerning their critical habitat designation. We limited our review to species that had critical habitat formally designated within the past 10 years; we excluded 3 species from our review either because the species critical habitat was not yet finalized, or because it was designated prior to 1993.

parts of the area that fall within the mapped boundaries do not contain the primary constituent elements defined by the Service. For example, building structures, roads, or other major structures, such as an airport, may fall within the mapped boundaries of critical habitat, but are not suitable habitat. The Service maintains that these areas would not be considered critical habitat because they do not contain the primary constituent elements needed by the species. The Service stated that the precise mapping of critical habitat boundaries is impractical or impossible because the legal descriptions for these precise boundaries would be unwieldy.

The scientific controversy surrounding many of the critical habitat proposals that we reviewed stems from disagreement or confusion over which areas within the land outlined by the Service would count as critical habitat. Critics responding to these proposed rules often complained that the Service's definitions of primary constituent elements were vague or too broad to be useful. Additionally, several critics found the Service's assertion that only areas containing primary constituent elements would be considered critical habitat to be confusing, noting that it did not allow for a discrete boundary. In some instances, landowners voiced concerns that their property fell within proposed critical habitat boundaries even though the land did not seem to contain the primary constituent elements. For example, critics of the proposed critical habitat of the California red-legged frog stated that the Service's description of the critical habitat was vague and did not specifically identify the locations of the frog's habitat.

Figure 6: California red-legged frog

Source: U.S. Fish and Wildlife Service.

Note: The California red-legged frog is the largest native frog found in the western United States, and its critical habitat consisted of over 4 million acres in California.

Critics of the rule stated that the proposal was confusing and that landowners would be forced to survey for the frog when undertaking a project. Such an action, they contended, is improper because it places the onus on private landowners to make sure their land does not contain critical habitat. The Service stated that due to the mapping unit it used it was not able to exclude all nonessential lands, such as roads. According to the Service, because these areas do not contain the primary constituent elements, federal agencies would not be required to consult the Service before taking action.

We also identified scientific disagreement stemming from designations made for species that require dynamic habitats. Designating critical habitat, which requires selecting a fixed habitat area, can be particularly difficult when a listed species may require a habitat that is dynamic, or changing, in nature. For example, lands that have been burned, cleared, or otherwise disturbed may be essential to a species or may be important for only

certain periods of a species' life cycle. Many landscapes change because of natural causes, such as the age and make-up of a forest, and therefore it may be difficult to designate one particular area as habitat because the area may change over time, causing a change in the value of the habitat for the listed species. For example, scientific disagreement surrounded the critical habitat designation of the Southwestern willow flycatcher partly because of the bird's changing habitat requirements. Comments received on the proposed critical habitat rule stated that because riparian habitats are in a constant state of change, any boundaries defined as critical habitat would also be subject to change. Further, according to critics, the boundaries described by the Service did not meet regulatory requirements because they were difficult to interpret and could change seasonally. In the final rule designating critical habitat, the Service agreed that its original boundaries of critical habitat did not incorporate the dynamic nature of riparian systems. To resolve this issue, the Service stated that the final boundaries would be established in accordance with the 100-year flood zone, which would include most changes in stream flow and most seasonal changes.

Figure 7: Southwestern willow flycatcher

Source: U.S. Geological Survey.

Note: The Southwestern willow flycatcher is a small bird found in the southwestern United States. The designation of the flycatcher consisted of more than 500 miles of river habitat in the southwest.

In addition to controversy surrounding the identification of specific areas for critical habitat, many critics of the proposed rules that we reviewed argued that the Service had insufficient information on which to base its determination and that the Service should not designate critical habitat until the habitat requirements of the species could be better defined. Other critics objected to the Service's use of unpublished or otherwise unavailable data, stating that this type of information is inadequate to support critical habitat designations. Service officials said that they have been required to complete critical habitat decisions under short time frames because of court-imposed deadlines. According to Service officials, given the resource and time constraints under which Service scientists work, scientists are often unable to collect new information and agree that the information available may be limited. Thus, the Service relies on both

unpublished and published information and will use whatever scientific information it deems credible to help make a determination.

GAO Contact and Staff Acknowledgments

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