

high speed differentials. The NTSB study did not specifically recommend regulating the underside of fuel tanks.

The agency notes that, contrary to the petitioner's statement, neither the 1979 ECE Reg. No. 34 nor the 1995 German "Motor Vehicle Construction and Use Regulations" specify tests for the bottom of fuel tanks. Moreover, NHTSA has compared Federal Motor Vehicle Safety Standard (FMVSS) No. 301, Fuel System Integrity, to several foreign fuel system integrity standards, including ECE Reg. No. 34, and determined that NHTSA's standard requires more stringent crash tests than the ECE standard (60 FR 18566; April 12, 1995). As to the media reports about particular crashes that the petitioner believes involved the rupturing of the bottom of fuel tanks, the agency notes that only one of the four news reports clearly stated that the vehicle fire was caused by the rupture of the underside of the vehicle's fuel tank by roadway debris. The other three reports simply stated that the vehicles' fuel tanks ruptured after the vehicles struck a guardrail and, in one case, rolled over. Although the three reports did not specify the location of the ruptures, the description of the crashes indicate that the ruptures did not occur in the underside of the vehicles.

In addition to the information submitted by the petitioner, the agency considered its own information. As part of its research now underway relating to a possible upgrade of FMVSS No. 301, (49 CFR 571.301), NHTSA has collected data regarding vehicle crash fires. The data do not show a significant problem with vehicle fires resulting from the rupture of fuel tanks by roadway debris. According to a review of 1993-1995 Fire Case Reports from the National Automotive Sampling System (NASS)², 74.1 percent of all vehicle fires originate in the vehicle's engine compartment and 18.9 percent originate in the fuel tank. According to the review, most of the fires associated with the fuel tank involved ignition of gasoline leaking from ruptures or punctures due to collisions with other vehicles or due to single vehicles hitting roadway curbs, sign posts, embankments, etc., not roadway debris. The review identified five cases of vehicle fires originating in the undercarriage area between 1993 and 1995. In the first case, the crash investigation report stated that the fire occurred in the engine compartment "due to the undercarriage damage." The case was later reclassified as a "front" fire. In the second case, the crash

investigation report stated that the fire occurred during the vehicle's rollover sequence, off the roadway, after the vehicle hit a roadway "curbstone" at 40-45 mph and ruptured its fuel tank. In this case, one occupant suffered a Maximum Abbreviated Injury Scale 6 burn injury. In the third case, the crash investigation report stated that the vehicle struck and ran over a roadway sign post. The report said that the fire occurred off the roadway when the "stump" of the sign post punctured the vehicle's fuel tank "igniting the fumes and or fuel." In the fourth case, the crash investigation report stated that the vehicle went out of control and "went off the left side of the roadway down a steep embankment." It added that the fire occurred when gasoline from a leaking or ruptured fuel tank ignited. In the fifth case, the crash investigation report stated that the fire occurred when the vehicle hit an open man-hole and its "rear wheel sunk into the [hole] causing the gas tank to contact the roadway." No occupant suffered a burn injury in the third, fourth, and fifth cases. As previously stated, none of these fires occurred as a result of roadway debris striking the undercarriage of the vehicle. Even if the petitioner were referring in his petition to these types of events as well as fire occurrences due to roadway debris, any rulemaking action to only address this problem would be very limited in scope and would not be significant enough to warrant an amendment of FMVSS No. 301.

On April 12, 1995, NHTSA published an Advance Notice of Proposed Rulemaking (ANPRM) announcing the agency's plans to consider upgrading FMVSS No. 301 by making the crash requirements more stringent and by broadening the standard's focus to include mitigation concepts related to fuel system components and environmental and aging tests related to fuel system components (60 FR 18566). The notice announced a three-phase approach to upgrade the standard: Phase 1, Component Level Performance; Phase 2, System Level Performance; and Phase 3, Environmental and Aging Effects.

As part of its ongoing effort to upgrade the standard, the agency is conducting research and evaluation on high incidence cases of vehicle fires, including ones associated with rear impact crashes and with the engine compartment originated fires occurring in frontal crashes. Further, the agency is currently pursuing an upgrade of the current rear impact requirements of FMVSS No. 301. This should result in improved vehicle fuel system protection, including improved fuel tank integrity. The agency conducted a

series of rear impact tests on various vehicle sizes and is currently planning a series of repeatability tests. The results of this research program will serve as a basis for an agency decision as to whether to issue a proposal to amend the standard.

In accordance with 49 CFR part 552, this completes the agency's review of the petition. The agency has concluded that there is no reasonable possibility that the amendment requested by the petitioner would be issued at the conclusion of a rulemaking proceeding. After considering all relevant factors, the agency has decided to deny the petition.

Authority: 49 U.S.C. 30103, 30162; delegation of authority at 49 CFR 1.50 and 501.8.

Issued on: August 27, 1998.

L. Robert Shelton,

Associate Administrator for Safety Performance Standards.

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AE31

Endangered and Threatened Wildlife and Plants; Final Rule To List the Illinois Cave Amphipod as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines the Illinois cave amphipod (*Gammarus acherondytes*) to be an endangered species pursuant to the Endangered Species Act (Act) of 1973, as amended. Historically, the Illinois cave amphipod was known from six cave streams in Monroe and St. Clair counties, Illinois. This amphipod is a cave-dependent species living in the dark zone of cave entrances. Recent surveys have found the species at only three of the original six sites, although one of the six sites is no longer accessible for surveys. This species is believed to be threatened primarily by degraded groundwater quality resulting from various sources, such as the application of agricultural and residential pesticides and fertilizers in cave stream recharge areas, and contamination from human and animal wastes from residential septic systems and livestock feedlots. This action implements the Federal protection of the Act for the Illinois cave amphipod.

² "Clinical Review of NASS Fire Case Reports," Contract No. DTNH22-93-C-07034, January 24, 1997.

DATES: This rule is effective October 5, 1998.

ADDRESSES: The complete file for this rule is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service's Rock Island Field Office, 4469 48th Avenue Court, Rock Island, Illinois 61201.

FOR FURTHER INFORMATION CONTACT: Richard C. Nelson, Field Supervisor, Illinois Field Office (see **ADDRESSES** section) (telephone 309/793-5800; facsimile 309/793-5804).

SUPPLEMENTARY INFORMATION:

Background

Hubricht and Mackin (1940) described the Illinois cave amphipod (*Gammarus acherondytes*). Leslie Hubricht collected the Type specimens in 1938 from Morrison's Cave (now Illinois Caverns), near Burksville, Illinois.

Sexually mature males are up to 20.0 millimeters (mm) (0.8 inch (in.)) long; sexually mature females are 12.0 to 16.0 mm (0.5 to 0.6 in.) long. The amphipod's color is light gray-blue, and the eyes are reniform (kidney-shaped), small and degenerate with the pigment drawn away from the facets in an irregular black mass. The first antenna is long and slender, more than one-half the length of the body. The primary flagellum has up to 40 segments and the secondary flagellum has up to 6 segments. The second antenna is about three-fourths as long as the first antenna. The flagellum of the second antenna has up to 18 segments and lacks sensory organs in either sex. Hubricht and Mackin (1940) reported that its clutch size is up to 21 eggs, and Holsinger (1972) reported that ovigerous (egg-bearing) females have been observed in summer and fall.

This species is best differentiated from other amphipods in the field, especially from *Gammarus fasciatus*, which it resembles, by its color, small degenerate eyes, and a much longer first antenna. It is usually associated with the larger *G. troglophilus* (Hubricht and Mackin 1940) but is much less common (Holsinger 1972).

This species is a troglotic (cave-dependent) species inhabiting the dark zone of cave streams. As a group, amphipods require cold water and are intolerant of wide ranges in temperature. They are strongly sensitive to touch and react negatively to light. High levels of dissolved oxygen appear to be an environmental necessity. They are omnivorous scavengers, feeding on dead animal and plant matter or the thin bacterial film covering most submerged

surfaces throughout their aquatic habitat.

The Illinois cave amphipod is endemic to the Illinois Sinkhole Plain of Monroe and St. Clair counties and was historically known from six cave systems, which are all within a 16-kilometer (10-mile) radius of Waterloo, Illinois. The main entrances to two of the caves, Illinois Caverns and Fogelpole Cave, are in public ownership and the other four are privately owned. The cave streams from which this species is historically known are each fed by a distinct watershed or recharge area; and there are no known interconnections between them, or with other cave systems. Two of the six caves may become hydrologically connected during extremely high rainfall over short periods of time (Samuel V. Panno, Illinois Natural History Survey, Champaign, IL, *in litt.* 1996). Thus, it is believed that there is virtually no opportunity for this species to become distributed to other cave systems via natural pathways.

There are few data or adequate survey techniques on which to base population, productivity, or trend estimates for this species. Sampling for cave fauna is difficult at best, and the challenges of surveying are compounded by the relatively small size of this species and the difficulty of researchers to distinguish it from other similar amphipods in the field. Thus, survey data are not sufficient to accurately record numbers of this small subterranean invertebrate; however, they do demonstrate a reduction in its range and the number of extant populations. Since Hubricht's initial 1938 collections of unknown numbers from 2 caves, other collections have been made in 1965 (at least 19 specimens taken from the 2 caves sampled in 1938, plus a third cave), 1972 (unknown numbers taken from 2 additional caves), 1974 (6 specimens taken from 1 cave sampled in 1938), 1986 (2 specimens taken from 1 cave sampled in 1938 and from a new, sixth cave), 1992 (20 specimens taken from 1 cave sampled in 1938), and 1993 (11 specimens taken from 2 caves sampled in 1938) (Webb 1995).

The most recent and extensive sampling effort was in 1995 in which the Illinois Natural History Survey (INHS) investigated 25 caves in the Illinois Sinkhole Plain and confirmed the presence of the species in only 3 of the original 6 cave systems, all in Monroe County. The species was not found in any additional caves (Webb *et al.* 1993, Webb 1995). In 1995, 56 specimens were taken from Illinois Caverns, 19 specimens from Fogelpole

Cave, and 2 specimens from a third, privately owned cave. The species appears to be extirpated from the two caves where no specimens were collected in 1965 or 1986. Its status in a sixth cave is currently unknown because the cave entrance has been closed by the landowner, thus the cave has not been re-surveyed since 1965. Due to the extensive searches by INHS, it is possible, but unlikely, that there are populations in other caves in the Illinois Sinkhole Plain. The INHS made an intensive effort to collect in all small side rivulets and drip pools in the 25 caves it sampled and believes that the collection results reasonably reflect the relative abundance of the species in cave streams of the Sinkhole Plain (S.J. Taylor, INHS, *in litt.* 1998).

Previous Federal Action

On May 22, 1984, the Service published a notice of review in the **Federal Register** (49 FR 21664) designating the Illinois cave amphipod as a category 2 candidate species. Category 2 was composed of taxa for which the Service had information indicating that threatened or endangered status might be warranted, but for which adequate data on biological vulnerability and threats indicated that listing was possibly appropriate, but for which data were not sufficient to support issuance of listing proposals. The species was again included as a category 2 candidate species in the notice of review published in the **Federal Register** (54 FR 554) on January 6, 1989. On November 21, 1991, the Service published a notice of review in the **Federal Register** (56 FR 58804) designating the species as a category 1 candidate. Category 1 taxa were those for which the Service had substantial biological information on hand to support proposing to list the species as threatened or endangered. The species was again included as a category 1 candidate species in a notice of review published in the **Federal Register** (59 FR 58982) on November 15, 1994. On February 28, 1996, the Service published a notice of review in the **Federal Register** (61 FR 7596) which eliminated the several candidate category designations of previous notices and identified the amphipod as a candidate species with a listing priority of 2. On July 28, 1997, the Service published the proposed rule (62 FR 40319) to list the Illinois cave amphipod as endangered. The Service reopened the public comment period on October 9, 1997, (62 FR 52679) for 60 days at the request of the Illinois Farm Bureau Federation, the St. Clair County

Farm Bureau Federation, the Growmark Corporation, and Congressman Jerry F. Costello, because seasonal agricultural activities may have made it difficult for some interested and potentially affected parties to prepare and submit timely comments on the proposal. That comment period closed on December 8, 1997.

The processing of this final rule conforms with the Service's revised Listing Priority Guidance published in the **Federal Register** (63 FR 25502) on May 8, 1998. The Guidance revised the order in which the Service will process rulemakings during fiscal years 1998 and 1999. The Guidance calls for giving highest priority to handling emergency listings (Tier 1) and second highest priority (Tier 2) to all other listing actions except the designation or revision of critical habitat. Critical habitat designations or revisions are Tier 3 actions. Processing of this final rule falls under Tier 2.

Summary of Comments and Recommendations

In the July 28, 1997, proposed rule and October 9, 1997, notice reopening the comment period, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate Federal and state agencies, county governments, scientific organizations, agricultural organizations, and other interested parties were contacted and requested to comment. Newspaper notices were published in local and regional newspapers across the range of the species inviting public comment.

The Service received comments from 27 individuals and organizations during the comment periods; some parties provided more than one comment letter. Eight commenters supported the proposal. Twelve parties expressed concern over the possible effect the listing may have on their area of interest (agriculture or cave visitation), and several offered rebuttals to the Service's rationale but did not directly oppose the proposal. Four commenters expressed opposition to the proposal.

Written comments received during the comment periods are addressed in the following summary. Comments of a similar nature are grouped together.

Issue 1: The Federal Government, and hence the Service, does not have the authority to list a species found in only one State, because regulation of such species does not impact upon interstate commerce.

Service Response: A December 5, 1997, decision by the U.S. Court of Appeals for the District of Columbia

Circuit, *National Association of Home Builders et al. v. Babbitt*, 130 F.3d 1041 (D.C. Cir. 1997), a case challenging protection of the Delhi Sands flower-loving fly under the Act, addressed this issue. The ruling affirms Congress' authority to protect endangered species whose range is limited to a single State. The Court clearly recognized that the extinction of even a single species may have significant effects on the health of an ecosystem and ultimately on the commerce of the nation.

Issue 2: Little information exists on the value of this species to humans.

Service Response: Congress did not make a distinction between those species that are currently known to have some commercial or economic value and those that do not; the Act applies to all species in danger of extinction. Economic or commercial value is not a consideration in a listing decision. However, the Service realizes that it is difficult to describe the need to protect a species that most people will never see and that has no obvious economic, commercial, recreational, or aesthetic value. One of Congress' underlying principles when enacting the Act was that allowing any species to go extinct could result in unforeseeable adverse effects, because we may not know what contribution that species later may be found to have for the good of humans. There are many examples of plant and animal species that have been found useful in the treatment of diseases or in scientific research that provide benefits. Once a species becomes extinct, that potential benefit is lost forever.

From an ecological perspective, an amphipod belongs to a group of species called detritivores that consume dead and decaying organic matter, recycling their nutrients back into the environment. Nutrient recycling is a critically important function in all ecosystems, especially nutrient-poor cave ecosystems. Amphipods can also be considered to be indicator species, that is, species especially sensitive to physical and chemical changes in their habitat, which can tell us when there is something critically wrong in their environment, and ours.

Issue 3: The Service lacks the scientific data to justify listing this species since there has been inadequate sampling conducted: one cave in which the species historically occurred could not even be surveyed.

Service Response: The Service believes that the sampling efforts conducted in 1993 and 1995 were by far the most intensive and extensive to date, and were appropriate to demonstrate the decline in the species' range with a high degree of certainty. In

1995 the INHS sampled 25 caves in the Illinois Sinkhole Plain and found *Gammarus acherondytes* in only 3 caves (Webb *et al.* 1993, Webb 1995). In 1 cave that historically contained *G.*

acherondytes, for example, a total of 561 amphipods from other species were collected without collecting any *G. acherondytes*. In a second cave that historically contained the species, 673 amphipods were collected without taking any *G. acherondytes*. If it is present in either of these caves, it would have to be extremely rare, constituting less than 2 individuals per 1000 amphipods sampled. By comparison, *G. acherondytes* appeared in higher numbers in much smaller amphipod samples in Fogelpole Cave (at a rate of more than 50 individuals per 1000 sampled) and Illinois Caverns (at a rate of about 250 individuals per 1000 sampled). If the species is present in significant numbers in the other 2 caves, it should have been readily collected in mainstream samples at the level of sampling intensity that was carried out in the 1993 and 1995 surveys. More intensive collecting, in which thousands of amphipod specimens are taken from each cave for later identification, might be inappropriate and probably unhealthy for the cave community. Such intensive collecting might decimate or extirpate an amphipod species whose numbers already are extremely low. Although survey data cannot unequivocally prove that the species is extirpated from any cave, they demonstrate that the most optimistic scenario is that the species is extremely rare, and its numbers have decreased since the surveys done prior to 1993.

The Service recognizes that the species may still occur in the one cave whose entrance has been closed by the landowner, and we have not made the assumption that it has been extirpated from that location. However, even if it does still occur there, the data indicate that the species' range has decreased from six caves to three or four.

Issue 4: Recent sampling efforts have yielded more specimens than previous efforts, indicating that species numbers may actually be increasing.

Service Response: The Service acknowledges a remote possibility that the species may be found in other cave streams in the sinkhole plain. There is also a chance that it may be found in other locations within Fogelpole Cave and Illinois Caverns. However, the Service believes the sampling effort that was expended looking for this species is more than adequate and reasonably reflects the relative abundance and diminishing distribution of the species in cave streams of the sinkhole plain.

The Service does intend to keep looking for this species in other locations, however.

With regard to estimating the actual population of this species, the Service acknowledges that it is not likely to ever achieve that goal, regardless of the amount of effort put into surveys. The nature of this species and its habitat make it difficult, at best, to survey for it. Furthermore, the current identification technique for the species requires that it be sacrificed. It would be counter productive to sacrifice substantial numbers of an extremely rare species in order to obtain a more precise population estimate.

However, obtaining an accurate estimate of species numbers is not necessary for the Service to determine that the species warrants protection under the Act. What must be demonstrated is that its range has been significantly reduced and the threats to the species continue and can reasonably be expected to result in a further decline. An accurate population estimate also is not necessary to establish and achieve recovery goals for the species. Recovery can be achieved by protecting the quality of its habitat and by restoring stable and viable populations to the caves from which it has been extirpated. Once listed, the amphipod's relative abundance and population trend will be monitored safely using standard scientific methods.

Issue 5: The data do not conclusively show that agricultural chemicals are a threat to the species. Test data from the Monroe-Randolph Bi-County Health Department do not support the conclusion that groundwater is polluted. Contamination from pesticides is currently within acceptable limits and is likely to decline as agricultural Best Management Practices are implemented in the area.

Service Response: The Service agrees that more research needs to be done to further define the relative importance of agricultural chemicals as a threat to the species as compared to septic systems, livestock wastes, and the application of residential pesticides and fertilizers. However, the Service believes that all these sources contribute to the problem of groundwater degradation in the Sinkhole Plain. Research by Panno *et al.* (1996) as well as data obtained from the Monroe-Randolph Bi-County Health Department (*ibid.*), which tests drinking water supplies for nitrates and bacterial contamination, clearly demonstrate that groundwater degradation in the sinkhole plain is human-caused. In addition, pesticide levels may be within acceptable limits during most of the

year, however, it has been demonstrated that peak levels during spring and summer rainstorm events are much higher and may be lethal to the species.

One of the Service's peer reviewers of the proposed rule suggested that the primary threats to the species is a reduction in dissolved oxygen content of the stream which, at times, may fall below life-sustaining levels. To a limited extent, this is a natural phenomenon which occurs during a rainstorm event, and cave stream fauna can survive these short-term depressions provided the dissolved oxygen content does not reach lethal levels. However, as a result of human activities water now runs off the land more rapidly causing a greater depression of ambient dissolved oxygen in the cave stream and providing for dissolved oxygen content to reach lethal levels faster.

Agricultural chemicals can be lethal at certain concentrations, have chronic effects such as inhibiting reproduction, or leave the amphipod in a weakened condition and less able to cope with short-term depressions of dissolved oxygen (Thomas Aley, Ozark Underground Laboratory, *in litt.* 1997). Water sample analyses from springs, wells, and cave streams in the vicinity of these six caves, including one with the species still extant (Fogelpole), have found alachlor and atrazine, the latter at levels approaching those known to cause reproductive impairment in another amphipod species (Panno *et al.* 1996). DDE and dieldrin also were detected in invertebrate samples from Fogelpole Cave. There are also high levels of fecal coliform and enterococcus bacteria present; bacterial species which suggest both human and livestock sources.

The Service, in conjunction with the Illinois Department of Conservation, is funding a cave recharge study to delineate the areal extent of the watersheds of the three caves in which the species is found. This crucial first step will enable the Service to evaluate the land uses in the watersheds, determine the relative extent and nature of contaminant inputs to the groundwater, and identify the primary locations of these inputs. Furthermore, additional water quality testing and tissue analyses will be conducted to determine the levels at which contaminants cause mortality and/or changes in critical biological functions such as reproduction. With these data, the Service will be better able to address the threats to the species and to propose solutions in a recovery plan.

Issue 6: Urbanization and septic waste may be a greater threat than agriculture.

The application of pesticides on residential properties was proposed for exemption from the takings provisions of section 9 of the Act, but such applications are not as well regulated or monitored as agricultural applications and may, therefore, have a more significant impact on the amphipod.

Service Response: Due to inadequate data on the impacts of residential property pesticide use, and in response to public comments, the Service has modified the listing of activities that may potentially result in a violation of section 9 of the Act (see Available Conservation Measures section).

Issue 7: The species' decline may be due to natural causes.

Service Response: The Service acknowledges that there may be natural causes, such as severe weather or changing climatic conditions, contributing to the decline and extinction of any species. However, other likely causes were identified during the status assessment for this species. There is evidence that the deterioration of groundwater quality in the area coincides with an increase in residential development. There is further evidence that certain agricultural chemicals such as atrazine, which cause mortality in related amphipod species, are at or near lethal levels in the groundwater during certain periods. These factors indicate a human component to the decline of the species which is not a natural or cyclical phenomenon.

Issue 8: Metal ions found in amphipod tissue are not evidence of harm.

Service Response: The Service concurs with this statement. However, since several metal ions have been detected in amphipod tissues, the potential exists for acute or chronic effects to the species. The Service acknowledges that additional research is required to determine the nature and extent of any threat to the species that may be caused by metal ions in their environment.

Issue 9: Listing the amphipod will shut down farming in the area.

Service Response: The Service has no intention of halting farming in the Sinkhole Plain. We expect that any detrimental impacts on the amphipod due to agriculture can be reduced to a large extent through modest and localized land treatments, such as maintaining buffer strips around sinkholes, ensuring that chemicals are not dumped or spilled into sinkholes, and ensuring that livestock wastes do not leak or are not diverted into sinkholes. The Service will work with the Natural Resources Conservation

Service (NRCS), local agricultural representatives, and landowners to develop voluntary Conservation Agreements to implement Best Management Practices designed to protect surface and ground water quality. A similar approach will be applied to residential developments which might otherwise allow septic waste to be directed into sinkholes. The Service will work with developers, local planning and zoning boards, and health departments to develop alternatives to such practices.

Issue 10: Programs are currently in place which will reduce the threat of contaminants to the amphipod.

Service Response: The Service agrees that there are programs in place to reduce the threat of contaminants to the amphipod. However, many of these programs are voluntary, and the results of their implementation have been inadequately monitored and evaluated. Our hope is to expand, monitor, and improve upon existing programs to ensure a higher degree of participation and success.

Issue 11: Listing the species may limit the visitation of caves by the public.

Service Response: The proposed rule identified human use and visitation of caves as a potential threat to the species. However, whether this threat is significant depends on the level of use and the nature of the visitations. The Service will work with caving organizations such as the Illinois Speleological Society, as well as the Illinois Department of Natural Resources (DNR), to investigate the significance of cave visitation as a threat to the species and to develop measures to minimize any such threat. If cave visitation is found to be a significant threat to the survival and recovery of the amphipod, we will seek mutually acceptable measures to protect the species while minimizing any impact on cave visitation. We recognize the importance of caves such as Fogelpole and Illinois Caverns to the speleological community and have no intention of limiting cave visitation unless such limitations are necessary for the species' survival and recovery.

Peer Review

In accordance with policy promulgated July 1, 1994 (59 FR 34270), the Service solicited the expert opinions of independent specialists regarding pertinent scientific or commercial data relating to the supportive biological and ecological information for species under consideration for listing. The purpose of such review is to ensure listing decisions are based on scientifically sound data, assumptions, and analyses,

including input of appropriate experts and specialists.

Following the publication of the listing proposal, the Service solicited the comments of two biologists having recognized expertise in invertebrate zoology and one individual having recognized expertise in karst hydrology and underground environments and requested their review of the available data concerning the Illinois cave amphipod. In order to ensure an unbiased examination of the data, the Service selected individuals who had only minor or no involvement in previous discussions on the possible listing of the species.

Comments were received from all three peer reviewers within the comment period. The two biological reviewers concurred with the Service on factors relating to the taxonomic, biological, and ecological information and concurred with the proposal to list the Illinois cave amphipod as an endangered species. The karst hydrologist provided additional clarification of the importance of oxygen depletion as the primary mechanism by which the species is being harmed. That reviewer also concurred that the Illinois cave amphipod is in danger of extinction in the foreseeable future.

Summary of Factors Affecting the Species

Section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be threatened or endangered due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Illinois cave amphipod (*Gammarus acherondytes*) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The degradation of habitat through the contamination of groundwater is believed to be the primary threat to the Illinois cave amphipod. Karst terrain, where this amphipod is found, is a geologic land formation typified by sinkholes and fissures that provide direct and rapid conduits for water and water-borne material from the surface to the groundwater, thereby avoiding the filtering and cleansing mechanisms normally provided by overlying soils. Water movement from the land surface to the water table in karst terrain often is nearly instantaneous, and flood pulses following a rainstorm may cause levels of contaminants to become transiently higher (Libra *et al.* 1986), up

to 10,000 times higher than before the event (Quinlan and Alexander 1987).

There are several sources of groundwater contamination affecting the amphipod's habitat: (1) the application of agricultural chemicals, evidence of which has been found in spring and well water samples in Monroe County (Panno *et al.* 1996); (2) bacterial contamination from human and animal wastes, which finds its way to subsurface water via septic systems, the direct discharge of sewage waste into sinkholes, or from livestock feedlots (Panno *et al.* 1996); (3) the application of residential pesticides and fertilizers; and (4) the accidental or intentional dumping of a toxic substance into a sinkhole.

The primary mechanism threatening the species is believed to be a reduction in the dissolved oxygen content of underground cave streams which, at times, may fall below life-sustaining levels. To a certain extent, this is a natural phenomenon which occurs during a rainstorm event. Stormwater runoff is typically low in dissolved oxygen, and when it enters the groundwater, it depresses the ambient dissolved oxygen level in the cave stream. Under natural conditions, cave stream fauna can survive these short term, probably rare, depressions which may reach lethal levels.

However, human activities on the land surface have resulted in changes to this natural condition that make lethal levels of depressed ambient dissolved oxygen more common. With agricultural, residential, and municipal development, stormwater now runs off the land more rapidly, reducing the time in which it reaches underground streams. Because of this more rapid runoff, the ambient dissolved oxygen in the cave stream will be depressed to a greater degree and can reach lethal levels faster. Furthermore, pesticides typically bind to soil particles; with the loss of vegetated buffers around sinkholes and fissures, more soil particles erode from the land surface and enter the groundwater carrying more pesticides with them. In addition, nitrogen-based fertilizers and organic wastes increase the demand for dissolved oxygen to accomplish biochemical breakdown. These factors exacerbate the natural depression of dissolved oxygen levels. Furthermore, agricultural chemicals may either be lethal in themselves at certain concentrations, have chronic effects such as inhibiting reproduction, or can leave the amphipod in a weakened condition and less able to cope with short term depressions of dissolved oxygen.

The most commonly used herbicides (and their proprietary names) in Monroe County are atrazine, alachlor (Lasso), cyanazine (Bladex), metolachlor (Dual), glyphosate (Roundup), 2,4-D, imazaquin (Scepter), imazethapyr (Pursuit), and pendimethalin (Prowl) (Omar Koester, University of Illinois Extension Service, *in litt.* 1996). The Illinois State Geological Survey analyzed water samples from 9 springs, 1 cave stream, and 33 wells in Monroe County for bacteria and pesticides to determine if contamination is occurring (Panno *et al.* 1996). The agricultural herbicides atrazine and/or alachlor were detected in 83 percent of groundwater samples taken from springs in the study area. The levels of these herbicides in samples often exceeded the U.S. EPA Maximum Contaminant Levels of 2.0 parts per billion (ppb) and 3.0 ppb, respectively, during and following spring rainfalls. They reported maximum atrazine levels in spring samples as high as 98 ppb with the maximum level in Illinois Caverns being 1.38 ppb (Panno *et al.* 1996). Macek *et al.* (1976) observed acute toxicity to the amphipod *Gammarus fasciatus* from a 48-hour exposure to the herbicide atrazine at 2.4 parts per million (ppm). In addition, they reported reproductive effects and impaired survival of offspring from concentrations as low as 0.14 ppm of atrazine during chronic tests lasting 30,119 days (Macek *et al.* 1976).

The most commonly used insecticides in the region include carbaryl, carbofuran, chlorpyrifos, malathion, permethrin, methyl parathion, and phosmet. Mayer and Ellersieck (1986) reported that Gammaridae were most sensitive to the five insecticides carbaryl, DDT (dichloro-diphenyl-trichloroethane), endrin, malathion, and methoxychlor and postulated that pesticide pulses characteristic of karst springs could have major impacts on biota such as amphipods. Webb *et al.* (1993) analyzed amphipod and isopod tissue samples from numerous caves, including the three caves known to contain the amphipod, for pesticides and PCB's (polychlorinated biphenyls). DDE (dichlorodiphenyl-dichloroethylene) and DDD (1,1-dichloro,-2,2-bis(p-chloro-phenyl) ethane) (breakdown products of DDT) were detected in isopods from Fogelpole Cave, reflecting the historical use of the insecticide DDT in the drainage basin. In addition, dieldrin, the persistent breakdown product of the insecticide aldrin, was detected in invertebrate samples from Fogelpole Cave. Both DDT and aldrin have been banned from use

in the United States since 1973 and 1974, respectively. These data demonstrate some of the long term detrimental effects that agricultural chemicals can have on cave ecosystems. Interestingly, neither DDD, DDE, nor dieldrin were detected in water samples from Fogelpole Cave, supporting the premise that cave invertebrates accumulate and concentrate these toxins even though they do not exist at detectable levels in the cave water: cave invertebrates, therefore, serve as indicators of past and present contamination.

Research by Panno *et al.* (1996) as well as data from the Monroe-Randolph Bi-County Health Department (*ibid.*), which tests drinking water supplies for nitrates, clearly demonstrate that groundwater in the Sinkhole Plain contains anomalously large concentrations of nitrate (NO_3^-). Levels above 1.4 mg/L are assumed to be human-caused, and the main sources of nitrates are agricultural fertilizers, septic systems, and livestock wastes. Panno *et al.* (1996) found that the greatest range of nitrate concentrations in water samples from springs occurred around the time of spring planting, but it was concluded that nitrates in the shallow karst aquifer came from multiple sources.

Webb *et al.* (1993) also found detectable quantities of bromide, fluoride, sulfate, and nitrate in Illinois Caverns and Fogelpole Cave. In addition, they found detectable concentrations of calcium, sodium, magnesium, iron, manganese, silicon, and barium in water samples from Fogelpole Cave, and these plus aluminum, potassium, and phosphorus in Illinois Caverns. In amphipod tissue samples from Fogelpole Cave, they reported detectable concentrations of aluminum, boron, barium, calcium, chromium, copper, iron, potassium, magnesium, manganese, sodium, phosphorus, and zinc (Webb *et al.* 1993). The six highest ranked metals detected in amphipod samples were also the six highest ranked metals detected in water samples, indicating an apparent relationship between the concentrations of these metals in tissue and water. The acute and chronic effects of these ions on the Illinois cave amphipod are currently unknown, but their presence in amphipod tissues and the water samples provides evidence of potential harm.

In addition to chemical contamination, Panno *et al.* (1996) report that all springs and cave streams they sampled, as well as 29 of 33 wells, contained concentrations of coliform, fecal coliform, enterococcus, and

numerous other bacterial species that exceeded Federal drinking water standards. The bacterial species present strongly suggest contamination from both human and livestock sources. Prior to 1988, private and aeration-type septic systems were allowed to discharge directly into sinkholes, and most of those systems are still in existence. Although the practice was prohibited in 1987, exceptions are still granted in the study area (Panno *et al.* 1996).

In his studies, Poulson (1991) concluded that bacterial pollution from human and livestock wastes has varying degrees of impact on cave biota. At high levels of contamination, a high biochemical oxygen demand (BOD) kills all macroscopic organisms and leaves only strands of colonial sewage bacteria and associated protozoa. If the BOD is high but does not completely remove oxygen, then tubificid sewage worms become part of the faunal community. If the amount of wastes is not too great, as with the diffuse input from septic fields, the sewage fauna is only minimally developed, but the increased organic food supply favors survival and reproduction of shorter-lived non-cave-dependent macrofauna which may replace cave-dependent species. If the input of waste decreases later, chironomid midges and other non-cave-dependent species survive but can no longer reproduce, while the reproduction of short-lived cave-dependent isopods and flatworms is stimulated. At still lower impact levels, the reproduction of larger cave-dependent species, like crayfish, may also be stimulated.

The effects of bacterial contamination on the Illinois cave amphipod have not been studied. However, bacterial contamination is evidence of water quality degradation and could pose a threat to the species. Monroe County is within commuting distance of the St. Louis, Missouri, metropolitan area and is rapidly undergoing residential development. In fact, the increase in bacterial contamination of well water in the county coincided with the onset of accelerated development about 1987 (Poulson 1991). It is likely that the increase in bacterial contamination was the result of the installation of private septic systems in areas with soils of limited waste assimilation capacity and inadequate thickness, and the installation of systems that discharge septic effluent directly into sinkholes (Joan Bade, Monroe-Randolph Bi-County Health Department, Waterloo, IL., pers. comm. 1996).

The toxicity of contaminants to cave-dwelling species may be quite different than the response of their surface-

dwelling relatives, making the results of chemical analysis difficult to interpret. Due to their adaptations to a narrow range of environmental conditions, obligate cave species may be hypersensitive to chemical changes in ways that are not detectable by standard toxicity tests (Poulson 1991).

Contaminants known to be toxic to amphipods and other crustaceans have been shown to be present and increasing in cave streams in the local area. While direct mortality cannot be conclusively attributed to such agricultural chemicals as atrazine, carbaryl, DDT, or malathion, or to bacterial contamination, the presence of such contaminants in the amphipod's environment constitutes strong circumstantial evidence that the deterioration of water quality is the primary cause of the decrease in the species' range and the number of extant populations.

Human utilization of cave environments is a potential threat to this species. The accidental or intentional introduction of materials toxic to this species and habitat disturbance are potential hazards to the species during public visits to caves. None of the caves occupied by the amphipod have improved pedestrian walkways, and visitors must pass through the cave streams to access deeper passages. Such activities can physically disturb cave stream habitat, but the subsequent impact on the amphipod is unknown. Cave ecosystems are considered to be delicate.

The State of Illinois owns the main entrances to Illinois Caverns and Fogelpole Cave and manages them as satellites of the Kaskaskia River State Fish and Wildlife Area. The State allows a maximum of 25 individuals at a time to enter Illinois Caverns unsupervised, provided they obtain a permit and agree to conditions that prohibit littering or removal of biological materials. The Caverns are staffed during business hours by an on-site attendant. The main entrance to Fogelpole Cave, a dedicated Nature Preserve, is gated. The State does not allow any visitation of this cave except by permit for scientific purposes. Three privately owned entrances to a third cave containing the amphipod have also been dedicated as Illinois Nature Preserves. Such dedication implements landowner agreements to preserve and maintain existing conditions at these sites.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overexploitation or scientific collecting are not believed to be factors affecting the species' continued

existence at this time, but the Federal listing will prohibit unauthorized collection of individuals of the species. Exact numbers are unknown, but at a minimum 139 specimens have been collected from 6 caves over a 55-year period. Protection from collection may become important because collectors may seek the species once it becomes listed.

C. Disease or Predation

The importance of these factors is presently unknown.

D. The Inadequacy of Existing Regulatory Mechanisms

This species currently has no protection under Federal law. The Federal Cave Resources Protection Act of 1988 (16 U.S.C. 4301-4309; 102 Stat. 4546) seeks to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people. However, at this time, the Cave Resources Protection Act provides no protection to any caves containing, or potentially containing, Illinois cave amphipods, because none of the caves are on or under Federal land or are located in the immediate vicinity of Federal ownership. Therefore, these caves are ineligible for Federal protection under the Cave Resources Protection Act.

The Illinois cave amphipod is listed as an endangered species under the Illinois Endangered Species Protection Act. As such, it is protected from direct taking (i.e., injury or mortality) regardless of whether it is on public or private land. However, "take" under State law does not include indirect harm through such mechanisms as habitat alteration. As long as the actions of private landowners are otherwise in compliance with the law, actions which destroy or degrade habitat for this species are allowed under Illinois law.

State law requires consideration of this species during the planning processes of State agencies and local units of government which must consult with the Illinois DNR on the impacts of their proposed actions. The DNR will provide recommendations on how the impacts to the species can be avoided or minimized. The unit of government may accept or reject any or all recommendations (Illinois Administrative Code).

As mentioned under Factor A of this section, several of the entrances to caves containing the species are dedicated as Illinois Nature Preserves which is the strongest land protection mechanism in Illinois. Such dedication restricts future uses of the land, in perpetuity, for the purpose of preserving the site in its

natural state. The removal of biota from the site is prohibited except by permit and for scientific purposes only. Allowable uses of the site are limited to nonconsumptive, nondestructive activities. The landowner may decide whether to allow public access to the site, and management is accomplished in accordance with a master management plan prepared jointly by the Illinois Nature Preserves Commission and the landowner. Dedicated properties cannot be subdivided, and the dedication instrument is attached to the deed and recorded.

Ownership or protection of cave entrances does not necessarily ensure protection of the caves' environment, particularly water quality. Water quality is largely a function of land use in the cave stream recharge areas on the land surface, and the vast majority of the watersheds of all caves containing the amphipod is in private ownership, and land use is primarily agriculture. Recharge areas may be several square miles in size, and runoff and seepage from thousands of acres of agricultural land may be funneled into one cave system, thus increasing the magnitude of any toxic hazard posed by the use of agricultural chemicals. The application of pesticides is regulated by the U.S. Environmental Protection Agency (EPA), and maximum allowable application levels and use restrictions are printed on pesticide container labels. While pesticides may be applied fully in compliance with the restrictions, adverse impacts to the species may still result in karst systems.

Current State and local regulations are inadequate for protecting water quality in a sensitive geological formation like karst. St. Clair and Monroe counties are rapidly developing as residential communities for the St. Louis, Missouri, Metropolitan Area with most home sites being served by individual wells and septic systems. Septic systems may not perform as designed, and, in some cases, septic effluent drains directly into sinkholes. Studies have shown that there is no general housing density zoning in karst terrain that assures that groundwater quality will be protected when septic systems are used. The more houses there are in a spring or cave stream recharge area, the greater the chance that some of them will introduce contaminants into the groundwater system, and the greater the chance that one or more of the septic field systems will constitute a major source of groundwater contamination (Aley and Thompson 1984).

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Because of the low numbers of the Illinois cave amphipod and a highly restricted range, even the loss of a few individuals to natural events may be significant to the species' survival. As a group, aquatic amphipods have adapted to the extremes of natural events such as spring floods or high water discharges following rainstorms and, no doubt, some individuals are washed out of the cave environment during such events. Because the species is extant in only three or four cave systems within a relatively small geographic area, it is conceivable that a heavy spring snowmelt or rainstorm could cause a flushing of all systems at one time significantly affecting each population.

The risk of extinction due to the threats to the Illinois cave amphipod (*Gammarus acherondytes*) posed by the above factors is exacerbated by the small number of low density populations that remain. Although *Gammarus acherondytes* was always rare, the current population densities are likely much lower (due to the previously identified threats) than historical levels. Despite any adaptations to conditions which result in rarity, habitat loss and degradation increase a species' vulnerability to extinction. Environmental variation, whether random or predictable, naturally causes fluctuations in populations. However, populations with small numbers are more likely to fluctuate below the minimum viable population (i.e., the minimum number of individuals needed for a population to survive). If population levels stay below this minimum size, an inevitable, and often irreversible, slide toward extinction will occur. Small populations are also more susceptible to inbreeding depression and genetic drift. Populations subjected to either of these problems usually have low genetic diversity, which reduces fertility and survivorship. Lastly, chance variation in age and sex ratios can affect birth and death rates. Changes to demographics may lead to death rates exceeding the birth rates, and when this occurs in small populations there is a higher risk of extinction.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list the Illinois cave amphipod as endangered.

Critical Habitat

Critical habitat is defined in section 3 of the Act as: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Service regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist—(1) the species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. The Service finds that designation of critical habitat is not prudent for the Illinois cave amphipod.

Critical habitat receives consideration under section 7 of the Act with regard to actions carried out, authorized, or funded by a Federal agency (see Available Conservation Measures section). As such, designation of critical habitat may affect activities on Federal lands and may affect activities on non-Federal lands where such a Federal nexus exists. Under section 7 of the Act, Federal agencies are required to ensure that their actions do not jeopardize the continued existence of a species or result in destruction or adverse modification of critical habitat. However, both jeopardizing the continued existence of a species and adverse modification of critical habitat have similar standards and thus similar thresholds for violation of section 7 of the Act. In fact, biological opinions that conclude that a Federal agency action is likely to adversely modify critical habitat but not jeopardize the species for which the critical habitat has been designated are extremely rare.

Consultation is likely to occur with the NRCS and with the U.S. EPA for

programs administered by those agencies. For a species extant in only three or four small, discrete populations, any significant adverse impact to its habitat would likely jeopardize the species' continued existence. Therefore, for this species the threshold for a jeopardy determination is indistinguishable from the threshold for determining adverse modification of critical habitat. For these reasons, the designation of critical habitat for the Illinois cave amphipod would provide no additional benefit to the species beyond that conferred by listing, and therefore, such designation is not prudent.

The nature of karst terrain means that surface features such as sinkholes, fissures, and disappearing streams provide direct surface connections to the cave streams inhabited by the amphipod. Publishing a critical habitat map would delineate the recharge areas of these caves. The Service believes such a map would make it easy to locate the surface connections to the cave streams and could promote vandalism in the form of intentional introduction of toxic chemicals into the underground system. Although vandalism has not been documented as a past threat to the Illinois cave amphipod, listing it as an endangered species publicizes the present vulnerability of this species, and thus can be reasonably expected to increase the threat of vandalism or intentional destruction of the species' habitat. In light of the vulnerability of this species to vandalism or the intentional destruction of its habitat, publication of descriptions of habitat features and maps providing its precise locations within areas of accelerating development, as required for the designation of critical habitat, would reasonably be expected to increase the degree of threats to the species, increase the difficulties of enforcement, and further contribute to the decline of the Illinois cave amphipod. Designation of critical habitat for the Illinois cave amphipod would, therefore, provide no benefit to the species apart from the protection afforded by listing the plant as threatened.

Protection of the habitat of the Illinois cave amphipod will be addressed through the section 4 recovery process and the section 7 consultation process. Although this amphipod occurs only on private and State land, it may be affected by projects with Federal connections. The Service believes that activities involving a Federal action which may affect the Illinois cave amphipod can be identified without designating critical habitat, by providing Federal agencies with information on

the location of occupied habitat and recharge areas and information on the kinds of activities which could affect the species. For the reasons discussed above, the Service finds that the designation of critical habitat for Illinois cave amphipod is not prudent.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened, and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to ensure activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to modify its critical habitat. If a Federal agency action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions that may require consultation as described in the preceding paragraph include activities by the NRCS such as the Conservation Reserve Program, the Environmental Quality Incentive Program, and the Highly Erodible Land and Wetland Conservation provisions of the Food Security Act of 1985. These activities are expected to generally benefit the species through the protection of groundwater quality. In addition, consultation may be required with the U.S. EPA on the use of pesticides in the watersheds of the species' range.

The Act and implementing regulations found at 50 CFR 17.21 set forth a series of general prohibitions and exceptions that apply to all listed wildlife. The prohibitions, as codified at 50 CFR 17.21, in part, make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect; or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce, any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23, and 17.32. For endangered species, such permits are available for scientific purposes, to enhance the propagation or survival of the species, or for incidental take in connection with otherwise lawful activities.

It is the policy of the Service, published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of the listing on proposed and ongoing activities within a species' range. The Service believes that, based upon the best available information, the following actions will not result in a violation of section 9, provided these activities are carried out in accordance with existing regulations and permit requirements:

(1) Construction and use of properly constructed and properly functioning sewer systems within the species' range.

(2) Visitation of Fogelpole Cave by permitted individuals.

(3) Agricultural activities outside of the recharge areas for caves known to contain Illinois cave amphipod.

(4) Agricultural activities within the known recharge area of caves known to contain the Illinois cave amphipod if such activities incorporate Service-approved practices designed to protect surface and ground water quality. Such practices will include buffer strips around sinkholes and losing streams, diversion of animal wastes away from sinkholes and losing streams, and avoidance of agricultural chemical spills or disposal into sinkholes.

Activities that the Service believes could potentially result in section 9 violation include, but are not limited to:

(1) Use, application, or discharge of agricultural and residential chemicals, or other pollutants, particularly insecticides, onto plants, soil, ground, water, or other surfaces within the recharge areas of the species' range when conducted in violation of label directions, or following Service notification that such use, application, or discharge is likely to result in deterioration of cave water quality and harm to the species. Buffer zones, indicating areas within the recharge areas requiring special precautions for the Illinois cave amphipod, will be identified by the Service; maps of these buffer zones will be provided to the appropriate landowners and government officials.

(2) Discharging of agricultural and residential chemicals or other pollutants including debris, garbage, trash, septic effluent, animal waste, or any other foreign material into sinkholes or fissures in the recharge areas of the species' range.

(3) Construction of new private septic systems or any identified use of improperly functioning existing private septic systems in the recharge areas of the species' range, following Service notification that such construction or use is likely to cause significant water quality degradation and harm to the species. The Service will provide a reasonable period of time to correct or mitigate such system deficiencies.

(4) Impoundment, water diversion, draining, ditching, or discharging of fill material in wetlands, sinkhole lakes and ponds, sinkholes, fissures, and human-caused reduction or loss of streams within recharge areas of the species' range if such activities significantly adversely affect the supply or quality of water in the cave streams wherein the species is found and result in take or harm to the species.

(5) Visitation or use of Illinois Caverns and other caves identified as containing this species following Service notification that such visitation or use is likely to cause the significant habitat degradation and/or harm to the species.

Questions regarding whether specific activities may constitute a violation of section 9 should be directed to the Field Supervisor, Rock Island Field Office (see **ADDRESSES** section). Requests for copies of the regulations regarding listed species and inquiries about prohibitions and permits may be addressed to U.S. Fish and Wildlife Service, Division of Endangered Species, Whipple Federal Building, 1 Federal Drive, Ft. Snelling,

Dated: August 22, 1998.

Jamie Rappaport Clark,

Director, Fish and Wildlife Service.

[FR Doc. 98-23729 Filed 9-2-98; 8:45 am]

BILLING CODE 4310-55-U

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 32

RIN 1018-AE68

1998-99 Refuge-Specific Hunting and Sport Fishing Regulations

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Fish and Wildlife Service (Service or We) adds additional national wildlife refuges (refuges) to the list of areas open for hunting and/or sport fishing, along with pertinent refuge-specific regulations for such activities; and amends certain regulations on other refuges that pertain to migratory game bird hunting, upland game hunting, big game hunting and sport fishing for the 1998-99 season.

DATES: This rule is effective September 3, 1998.

FOR FURTHER INFORMATION CONTACT: Stephen R. Vehrs; Telephone (703) 358-2397; Fax (703) 358-1826.

SUPPLEMENTARY INFORMATION: National wildlife refuges generally are closed to hunting and sport fishing until opened by rulemaking. The Secretary of the Interior (Secretary) may open refuge areas to hunting and/or fishing upon a determination that such uses are compatible. The action also must be in accordance with provisions of all laws applicable to the areas, must be consistent with the principles of sound fish and wildlife management and administration, and otherwise must be in the public interest. Management is intended to ensure that the biological integrity, diversity, and environmental health of the National Wildlife Refuge System (System) are maintained for the benefit of present and future generations of Americans.

We review refuge hunting and fishing programs annually to determine whether to add additional refuges or whether individual refuge regulations governing existing programs need modification, deletion or additions made to them. Changing environmental conditions, State and Federal regulations, and other factors affecting wildlife populations and habitat may warrant modifications ensuring

continued compatibility of hunting and fishing programs and that these programs will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.

50 CFR part 32 contains provisions governing hunting and fishing on national wildlife refuges. Hunting and fishing are regulated on refuges to:

- Ensure compatibility;
- Properly manage the fish and wildlife resource;
- Protect other refuge values; and
- Ensure refuge user safety.

On many refuges, the Service policy of adopting regulations identical to State hunting and fishing regulations is adequate in meeting these objectives. On other refuges, it is necessary to supplement State regulations with more restrictive Federal regulations to ensure that we meet our management responsibilities, as outlined under the section entitled "Statutory Authority." We issue refuge-specific hunting and fishing regulations when a wildlife refuge is opened to either migratory game bird hunting, upland game hunting, big game hunting or sport fishing. These regulations list the wildlife species that may be hunted or are subject to sport fishing, seasons, bag limits, methods of hunting or fishing, descriptions of open areas, and other provisions as appropriate. 50 CFR part 32 contains previously issued refuge-specific regulations for hunting and fishing. We promulgate many of the amendments to these sections to standardize and clarify the existing language of these regulations.

Specifically part 32 prohibits the use or possession of toxic shotgun pellets by upland game hunters on Waterfowl Production Areas (WPAs) and certain other areas (refuges, or areas within refuges) of the System to the extent needed to protect against significant exposure to migratory birds as delineated on maps, leaflets and/or signs, available at each refuge headquarters or posted at each refuge, or as stated in refuge specific regulations. This regulation does not apply to turkey and deer hunters using buckshot or slugs, except as specifically authorized by refuge specific regulations.

The only shot allowed in such areas of the System is specifically identified in 50 CFR 20.21(j). The currently approved shot types listed in that regulation are: steel, bismuth-tin and tungsten-iron. Refuge waterfowl and other migratory birds ingest toxic lead by-products of refuge public hunting programs through their feeding habits and die from lead poisoning. We permit hunting programs on many areas of the

System in accordance with existing management plans, policy, procedures and regulations.

Response to Comments Received

In the July 27, 1998, issue of the **Federal Register** (63 FR 40080-40091) we published a proposed rulemaking identifying the refuges, their proposed hunting and/or fishing programs and invited public comments. All substantive comments were reviewed and considered following a 30-day public comment period.

One State conservation agency, four non-government organizations, and 7 individuals commented on the proposed rulemaking. Nearly all comments were concerning the length of the comment period provided, the basic proposal to hunt, or not hunt and the requirement to use or expand the use of nontoxic shot on refuges and WPAs. This specific proposal would authorize certain refuge hunting programs and prohibit the use or possession of toxic shotgun pellets by upland game hunters onto (WPAs) and certain other areas (refuges, or areas within refuges) within the System to the extent needed to protect against significant exposure to migratory birds as delineated on maps, leaflets and/or signs, available at each refuge headquarters or posted at each refuge, or as stated in refuge specific regulations. Refuge managers have the responsibility to determine, on a case by case basis, how much of a refuge acreage would require nontoxic shot based on wetland habitats.

Comment: The public has not been afforded a meaningful opportunity to comment on the proposal.

Response: A 30-day public comment period was afforded the public to comment on the proposed rule. News articles concerning proposed regulations that address the adverse affects of hunting upland and other small game with toxic lead shot in upland areas subject to periodic flooding and seasonal wetland areas have been published in newspapers during the last 6 years. Nontoxic shot for hunting upland and small game was first introduced to west coast refuges in the 1991-92 hunting season, and to southwestern refuges during the 1992-93 hunting season. Refuges in Alaska and waterfowl production areas in the lower 48 states are scheduled to phase in nontoxic shot to hunt certain upland and other small game by the 1997-98 and 1998-99 seasons respectively.

Specifically, in the August 16, 1995, issue of the **Federal Register**, (60 FR 42667-42677), and again in the December 4, 1995, issue of the **Federal Register** (60 FR 62035-62049), the